Telephony.

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I admit that competition is sometimes cruel and oftentimes wasteful and extravagant, but it does distribute wealth and it does it with infinitely more justice than monopoly will do it. In the end the people who buy, will PAY MORE under monopoly than under competition, and in the end the profits of capital will be VASTLY MORE under monopoly than under competition. If it were not so, there would be no motive for either trusts or monopolies. It is folly to believe that the public will endure a system which will permit capital to be rewarded with profits determined by no other force than successful selfishness. In this age and in the ages to come, the many will not be slaves to the few, and the sooner we accept the truth that we must re-establish and reinvigorate competition in those fields from which it has been driven, or in which it has been impaired, the better it will be for our institutions.—Extract from recent speech by United States Senator Cummins, of Iowa.

Is It Impossible for a Municipality to Regulate Rates?

Can any city council be relied upon to regulate public utility rates fairly?

Los Angeles and Chicago seem to be doing their best to prove that theirs cannot. And if the councils in these cities succeed in embarrassing their respective city governments with losing lawsuits, it will be a long step toward the end of all direct municipal control over public utility rates in this country.

Some months ago we asked the question which again heads this column. Alderman Pringle, then heading the Chicago council rate committee, took us to task in an article in *The Voter* for publishing the query. Alderman Pringle stated the purpose of his committee to be fair—and acted on this plan. But an election has taken place. The committee in power is under control of a different complexion. The report of the second expert who investigated the telephone rates, and, like the first, found some of them too low, has been discarded. The committee threatens to turn loose on the telephone company a third man—who, prior to his employment on the gas rates, which were a campaign issue—announced his belief that he could find support for a 70-cent rate. And one of the aldermen is exploiting a "penny-a-talk" catchword campaign cry in the daily press.

Now turn to Los Angeles. Meyer Lissner, whose exertions for clean politics and clean government in California landed Johnson in the governor's chair, and made Lissner a man of national prominence, was chairman of the Board of Public Utilities. A year ago Sloan, of Wisconsin, was employed, made an investigation, found the telephone rates too low, and the Board recommended an advance to the council. Its recommendations were thrown out, and a lower scale adopted. The Home company accepted, under protest, for a year. The Pacific company went to the courts, and secured a temporary injunction preventing enforcement.

After a prolonged investigation Kempster B. Miller was employed by the city attorney to go over the situation and make a full report. His high professional standing was thoroughly understood in Los Angeles. It was known in advance that his report would present the real facts—no matter whom they hit.

Mr. Miller, his assistant, Mr. Keith, and their staff, made an appraisal of remarkable thoroughness, personally overseeing, listing, and valuing the Pacific company's entire Los Angeles plant. They investigated the books, analyzed and adjusted the revenue and expense accounts. Their report shows the rate situation in the aspect most favorable to the city, which an exhaustive investigation could deduce from the actual facts.

The value they set on the plant was $4,512,092—very close to Mr. Sloan's figure, $4,492,128. The balance of revenue over

MR. NALLY RE-AFFIRMS SINCERITY OF POSTAL TELEGRAPH PROPOSITION

In reply to a request from TELEPHONY to elaborate if possible, upon his proposition to connect generally with Independent telephone companies throughout the country, Edward J. Nally, vice-president and general manager of the Postal Telegraph-Cable Co., writes: "I do not know how I can be more explicit than I was in my statement, which you published, and which was published in 'The Postal Telegraph' monthly of July. We mean exactly what we say."

operating expenses left the company about 1 per cent. return upon the investment—clearly an inadequate return. The report showed clearly that the city attorney could not win in court for the rates the council had fixed.

Then Mr. Miller was employed by the Board of Public Utilities, and offered a new rate schedule, designed to give a fair return, and no more. The council would have none of it; and Lissner and his associates resigned, amidst a clamor which contained not one word of intelligent, fair criticism of the schedule.

Such mistakes may elect to a city council a few men who ought not to be there. But they cost the public dear. The laws prevent the public from using telephone, or any other property, without compensation. It is the business of those charged with regulation to employ men who know how to get for the public the utmost service for the least money that the corporations can give without robbing their stockholders—and stop right there.

If the politicians make snap judgments on rates, lead the public to expect too much, and then cannot legally obtain it, they hurt the pocketbooks of their constituents. They hurt the utility companies—stop their growth, deprive the public of the extensions it needs, lower the quality of service, invite lawsuits—all at the public expense.

The public pays dear for the advertising the demagogues get.

The Right of Minority Stockholders to Prevent Sales.

The rights of minority stockholders in an Independent telephone company to prevent the majority from selling their stock to the confederates of the Bell telephone system, thus giving the latter the control of the corporation and leaving the minority stockholders shivering like shorn lambs in the cold, is a subject that deserves consideration, both for present relief and for future protection.

Most of such transactions are made upon the basis of physical valuation after the majority stockholders have been artfully led into a state of depression by the descendents of Yankee horse traders. The majority stock is then bought, and the property either operated for the advantage of the Bell interests, or the entire physical properties of the company sold or leased to some of the many Bell corporations. The minority stockholder is left to whistle for his money, and solace himself by contemplating his worthless stock certificates. Too often he has stood by and seen the deal made without objection, and when it is too late, finds himself estopped from attacking the validity of the sale.

Such a case was that of Bridges vs. Southern Bell Tel. & Teg. Company (71 S. E. 161) in which R. L. Z. Bridges, a minority stockholder of the Bainbridge Telephone Co. filed a petition against the company and the Southern Bell, alleging that the sale of the physical properties of the former company to the latter was without authority of law, without any resolution of its stockholders, and without any notice to the petitioner, and was made collusively and in defraud of his rights. It was shown in defense that Bridges had co-operated in the consummation of the sale of the physical properties of the company, and with the knowledge that the sale had been made and the purchase price paid had stood by and seen the purchaser expend large sums in the improvement of the property without objection, and waited an unreasonable time before making objection. The court held that Bridges was guilty of *laches* and could not succeed in his case, saying:

> Before a minority stockholder may proceed for acts *ultre vires* against the corporation, its officers and those participating therein, he must show, not only that the act is *ultra vires*, and that the majority of stockholders are illegally pursuing in the name of the corporation a course in violation of the rights of shareholders, but also that he acted promptly.

For the purpose of protecting their own interests, minority stockholders should therefore refuse to take any part in such proceedings, except to protest, and should act promptly in resentment of any illegal action. Such transactions will always be set aside if the act is *ultra vires,* if a conspiracy be shown, or if the act will result in the establishment of a monopoly, or in the stifling of competition. For the purpose of keeping themselves informed, minority stockholders should secure representation upon the board of directors by cumulative voting, if that is permitted. Illegal pools of stock should be dissolved by legal proceedings before it is too late. Any proposed merger law should, if possible, be equipped with a clause, such as was contained in the Nebraska bill recently vetoed by Governor Aldrich, to protect minority stockholders in case of the purchase of control by another company. Lastly, minority stockholders should remember the maxim, "Vigilance is the price of Liberty," and act accordingly.

Who Said Sherlock Holmes Was Dead?

"Some of the American people undoubtedly do wish to see the preservation of telephone competition," says an editorial in the Central Union (Bell) News.

Aha! The public is discovered at last! One step farther, you telephone user, and you will die in your tracks!

Business Hints from the Directory.

In one year 36 per cent, of the list in a telephone directory lying upon our desk requiring changing, for various reasons. This suggests a good deal of expense without corresponding return, from the company's standpoint; and from the side of the subscribers—the rate payers—it hints at an inequality of distribution of charges which is worthy of attention. This is a problem which would interest a strong-minded public utilities commission, in a state having a good, clear anti-discrimination law. What is the use of a commission's fussing with theories on "consumer" costs, "demand" costs, etc., while it totally overlooks the simple and obvious inequalities and inequities of costs due to installations of brief duration, moving, and like items suggested to even a casual observer of the annual shifting of directory lists?

G. H. Dixson, of Liberal, Mo., the man who arranged the book which caused this little discussion, calls the directory a "pretty good barometer, indicating the changes in man's activities. When more than 80 per cent. of the nation's population are renters, there is a good deal of moving, or shifting about."

Telephone companies have had this barometer before their eyes for years; but have they adopted the most logical method of taking care of the rough weather it indicates? One is inclined to doubt it.

Another Bad Spot in Bell Organization to be Covered

Rocky Mountain Bell, Admitted to be in Hopeless Financial Condition, Having Paid No Dividends for Four Years, and Steadily Going Downward, Absorbed by New Mountain States Company, Which Also Takes in Colorado Bell and Tri-State Bell, Latter One Year Old

Following its now well established policy of covering up the decayed spots in its system by merging unsound subsidiaries with reasonably sound ones, the American (Bell) Telephone & Telegraph Co. has organized the Mountain States Telephone & Telegraph Co., which has absorbed three other concerns—the Rocky Mountain Bell, the Colorado Telephone Co., and the Tri-State Telephone & Telegraph Co. The new company has an authorized capital stock of $50,000,000.

The Rocky Mountain Bell, with headquarters at Salt Lake City, operated in Utah, Idaho, Montana and Wyoming. The Colorado Bell, main offices at Denver, operated in that state and, until a year ago, in portions of New Mexico. The Tri-State Bell company was organized in the summer of 1910, to take over the Bell holdings in New Mexico, Arizona and parts of Texas. Its headquarters have been at El Paso, Texas.

The officers of the new company are: E. B. Field, president; E. B. Field, Jr., vice-president and treasurer; J. E. McDonald, secretary; Roderick Reid, general auditor; E. M Burgess, general manager. These formerly occupied similar positions with the Colorado Bell.

The new corporation, it is stated, is to divide the field into four parts. The Utah division will comprise all of Utah and Idaho, and southwestern Wyoming; the Colorado division will comprise all of Colorado and southeastern Wyoming; all of Montana and northern Wyoming will be included in the Montana division; the El Paso division will take in all of New Mexico, eastern Arizona, and territory contiguous to El Paso. The Utah headquarters will be at Salt Lake; the Colorado headquarters at Denver, those of the Montana division at Helena, and the El Paso division in El Paso.

By this transaction the parent Bell company evidently plans to wipe out one of the financially offensive units of its system, the Rocky Mountain Bell. This company has been going steadily down hill for a number of years. It has paid no dividends since 1907, when the disbursement for that purpose consumed not only all the net earnings, but necessitated a draft on the surplus to the extent of over $61,000. Since then it has struggled hopelessly on, getting more deeply mired every year.

The Colorado Bell, on the other hand, has been making a fairly good showing under the administration of the Fields, who have always had a more or less free hand in its management. The Tri-State has not been doing business long enough to have lost its grip financially. So two comparatively substantial, going concerns will now absorb and cover up the delinquencies of a third, which had admittedly become hopelessly involved.

The same method of obscuring a weak company by making stronger ones swallow it was pursued by the A. T. & T. in the absorption by the New York Telephone Co. of all the financially rotten Bell subsidiaries up-state, and by making the Pennsylvania Telephone Co. and the Bell of Philadelphia take in the decrepit Chesapeake & Potomac. Similar combinations are now being planned affecting the Missouri & Kansas, the Central Union and other Bell subsidiaries which have run aground financially after years of reckless management.

The official statement regarding the merger, as given out by the new Mountain States company, is most remarkable for its frankness in discussing the hopeless situation of the Rocky Mountain Bell. The statement is, in part, as follows:

> Rumors which have been prevalent for some time with reference to the acquiring of the Rocky Mountain Bell Telephone Co. properties by the Colorado Telephone Co. are confirmed by the action of the board of directors of the former company at its meeting held recently.
>
> A few days ago the Colorado company merged with its associate company to the south—the Tri-State Telephone & Telegraph Co., which has heretofore operated in southern New Mexico and eastern Arizona. The merged companies were rechristened the Mountain States Telephone & Telegraph Co., and the capital stock increased to $50,000,000; and the first act of the new corporation is the acquiring of the Rocky Mountain Bell properties by purchase.
>
> The official announcement of the reasons for the combination, as furnished at the headquarters of the Mountain States company at Denver, is as follows:
>
> To those who are familiar with the financial and operating methods of the American Telephone & Telegraph Co., the combining of the properties of the Colorado Telephone Co., the Rocky Mountain Bell Telephone Co., and the Tri-State Telephone & Telegraph Co. will be no surprise.
>
> Recently the Colorado Telephone Co. reached the limit of its capitalization, so that a recapitalization became necessary to it. The Tri-State Telephone & Telegraph Co. was similarly situated, and the Rocky Mountain Bell Tele-

HOW POSTAL ADVERTISES ITS POSITION AND THE MERITS OF COMPETITION

In these days of attempted monopoly, keen competition has its domain of power and achievement.

Competition,—sincere, aggressive and progressive,—is the one fundamental principle upon which the success of the Postal Telegraph-Commercial Cable System has been built.

The splendid service given by the Postal is the direct result of its independence and its aggressive and progressive policies.

Competition means efficiency! Competition means constant improvements of the equipment and abilities of the competing company, and the public benefits directly by these improvements, because of the company's desire to please and to demonstrate its own superior and distinctive merits.

A distinguished justice recently said: "There is no stronger inducement to the managers of a public service corporation to serve the public well, than a healthy apprehension that a rival concern will do so."

Compare the present efficient service of the Postal with the monopolistic service as it was years ago, before the Postal entered the field and when progressive competition did not exist!

The business interests of the country demand telegraph and cable competition.

The Postal Telegraph and Commercial Cables have been, and are today, the only bulwark between the public and telegraphic and ocean cable monopoly. The Postal has made marvellous strides in advance. Its service is the most complete and efficient in the world. Its equipment is the most modern, employes the most expert and its offices the most conveniently located.

If competition ceases, monopoly will obtain, service will retrograde, and progress will cease!

phone Co. has for several years felt the need of an entire reorganization. What, then, more natural than that the reorganization take the form of a merger of the properties, to be capitalized on a conservative basis and at figures which will insure reasonable returns to investors and equitable rates to the public?

The new corporation is capitalized at $50,000,000, but less than half this amount will be issued against the properties and an actual excess of physical property will be maintained over the amount of stock issued. There will be no preferred stock and no bonds, and no attempt will be made to pay dividends in excess of what the public might consider reasonable and honest. This financial policy is merely a continuation of that pursued by President Field, of the Colorado Telephone Co., for so many years.

Some knowledge of the Rocky Mountain Bell company may prove timely. It has generally been conceded to have been lacking in financial strength for a number of years, and therefore was unable to provide for extensions by the sale of its treasury stock. An extremely optimistic management built exchanges and toll lines considerably in excess of a dividend earning capacity and since dividends which would attract sufficient funds to provide additions and betterments were not forthcoming, the company has been forced to borrow the money needed for its growth, and the only market for stock has been in the neighborhood of sixty cents on the dollar.

The debt has reached a figure something like six and a half millions of dollars, but it is understood that in assuming this debt the Mountain States Telephone & Telegraph Co. expects to fund it in stock at a considerably lower figure. By doing this, and in purchasing the property from the stockholders at an equitable value, it would seem that the Mountain States Telegraph & Telephone Co. will have no difficulty in making this portion of its property earn dividends equal to those heretofore enjoyed by the stockholders of the Colorado Telephone Co. and the Tri-State Telephone & Telegraph Co.

Several prominent stockholders in the Rocky Mountain Bell Telephone Co. have expressed themselves favorably on the terms of the sale. Said one of them: "Better to have a $60 investment paying a steady income than a $100 investment whose greatest capacity merely allowed it to pay interest on its debts."

The cheerful candor with which the affairs of the Rocky Mountain Bell are admitted is probably attributable to a desire on the part of the new company to acquire the outstanding minority stock at "an equitable value," defined in this instance, by inference at least, as being "in the neighborhood of sixty cents on the dollar." The unfortunate minority stockholder of the Rocky Mountain Bell, therefore, is expected to not only be content in the fact of failure to receive dividends for the past four years, but to separate himself cheerfully from his holdings at a price equal to about one-half their face value.

Even with the advantage thus secured by the new company in buying the Rocky Mountain assets at a low figure, telephone and financial men express grave doubt as to the possibility of rehabilitating the property and placing it on a dividend paying basis.

New York Village Declares Poor Service and Increased Rates Due to Abolition of Competition.

At a recent meeting of the village board of trustees of Albion, N. Y., a resolution was adopted condemning the service of the New York (Bell) Telephone Co. in the village and vicinity and saying that the present service does not warrant an increase in rates.

Later an indignation meeting of the subscribers to the New York Telephone Co.'s service in Albion and adjacent territory was held, at which the following resolution was passed:

> Resolved, That it is the sense of this meeting that the advance in rates by the New York Telephone Co. is the result of the abolition of competition; that we believe that the service can be furnished in the village of Albion as formerly and at the same rate; that we request the board of trustees of the village of Albion to investigate and place the matter before the Public Service Commission, second district, for investigation and determination, and, if application is made, to grant a proper franchise to any person or company that desires to furnish telephone service to the citizens of Albion and vicinity.

The resolution was amended so that the following committee was appointed to act with the board of trustees in the matter: A. R. Allen, W. Cole Howard, Charles H. Porter, Samuel W. Smith, A. D. Bannister and Charles G. Porter.

Since the increase was announced hundreds of subscribers are said to have refused to meet the demands of the telephone company. The company says that it expects the Public Service Commission to sanction its action when a hearing is held.

Northwestern Bell Loses Suit Against Farmers in Minnesota—Fraud Alleged by Defendants.

The Northwestern (Bell) Telephone Exchange Co. has just lost an interesting suit at Windom, Minn., which was brought against thirteen farmers to enforce compliance with contracts entered into by them with the company. Over a year ago representatives of the Northwestern company went through that section and wrote a number of contracts with farmers providing that they were to build lines and connect them with those of the Bell. Each farmer signing agreed to pay $30 for a share in the new rural company.

Later they became dissatisfied and, after investigation, refused to allow the installation of the telephones and declined to pay the amounts agreed. Fraud and misrepresentation was alleged on the part of the Bell agents. At the trial the evidence of the Bell employes showed that the company had not completed its part of the contract and the judge sustained a motion that the jury be instructed to bring in a verdict in favor of the defendants. This was accordingly done.

Lyons, N. Y., Vainly Appeals to Commission for Relief From Poor Service and High Rates.

Nearly six months ago a complaint was made by the village board of Lyons, N. Y., to the Public Service Commission against the increased rates and poor service of the Wayne Telephone Co., which is a branch of the Bell system, but the commission has not yet given the users of telephones in this village a hearing. The date for the hearing was postponed several times at the request, it is said, of the telephone company.

About two months after the first complaint was sent to the Public Service Commission several of the officials of the telephone company appeared before the village board and requested it to withdraw the complaint. This move was met by a petition signed by about fifty leading business men, requesting the board to push with vigor the complaint already lodged with the commission.

The commission has advised the local authorities merely that it is crowded with work, but that it will attend to the matter as soon as possible. Meanwhile the Wayne company, which absorbed its competitor in Lyons recently, continues its higher schedule.

South Dakota Commission Ruling to Go to Court.

The South Dakota Railway Commission will probably be obliged to carry its ruling in the Beresford telephone case into court. The commission ordered the Beresford company to make connection between different branches of a country line entering into that town. The manager of the local exchange has refused to comply.

Postal Gives Telephone Service in West.

The Postal Telegraph-Cable Co. has now completed its telephone service between Reno, Nev., and San Francisco and intermediate points. The line is now open to the general public. A material reduction in rates has been made by the Postal company.

La Crosse Independent Makes Good Showing for Year

Wisconsin Company Publishes Statement for Fiscal Year Ended June 30, 1911, Showing Payment of 7 Per Cent. on Preferred Stock, 8 Per Cent. on Common—Operating Ratio Was 56.6 Per Cent.—Substantial Net Surplus Remained After Liberal Depreciation Provision

Devoting an entire page in the local papers to the publication of its statement covering the fiscal year ended June 30, 1911, the La Crosse (Independent) Telephone Co., La Crosse, Wis., presents an exceedingly gratifying showing.

The company pays 7 per cent. annually on its preferred stock and 8 per cent. on the common.

It closed the year with net surplus, after meeting all expenses, reserves, dividends, etc., of $3,162.80.

During the year $12,600 was applied to depreciation. At the close the reserve for this purpose aggregated $54,564.

Operating expenses were equal to 56.6 per cent. of the gross operating revenue.

On July 1, 1911, the total number of telephones in service was 3,617, to which should be added 388 owned by connecting companies, making a total available to subscribers of the La Crosse system, without toll charges, of 4,005. There were 385 stations added to the company's own system during the year.

The balance sheet of the La Crosse company, as of June 30, 1911, was as follows:

BALANCE SHEET.

As of June 30, 1911.

ASSETS.

Plant account June 30, 1910		$178,922.04
Additions during year—		
Land	$ 6,000.00	
Buildings, fixtures and grounds	2,171.93	
Wire plant construction and equipment	8,004.33	
Sub-station equipment	4,979.24	
General office equipment	296.89	
Stores department equipment	0.00	
Utility department (tools and teams)	210.00	21,662.39
Plant account June 30, 1911		$200,584.43
Current assets—		
Cash	$ 1,424.80	
Notes and bills receivable	1,700.00	
Accounts receivable, toll system	33.46	
Accounts receivable, exchange system	1,234.26	
Materials and supplies	10,916.88	15,309.40
Prepaid Accounts—		
Prepaid insurance	$ 176.18	
Prepaid directory	340.34	
Prepaid rent	120.00	636.52
Total assets		$216,530.35

LIABILITIES.

Common stock authorized and issued		$ 50,000.00
Preferred stock authorized	$150,000.00	
Less treasury stock	53,200.00	96,800.00
Total capital stock issued		$146,800.00
Depreciation reserve		54,564.19
Notes and bills payable (to individuals)		8,000.00
Accrued taxes		744.63
Accrued interest		108.00
Surplus		6,313.53
Total liabilities		$216,530.35

The revenue account, as submitted to the Railroad Commission of Wisconsin, for the year ended June 30, 1911, is as follows:

REVENUE ACCOUNT.

Year ended June 30, 1911.

OPERATING REVENUES.

Local subscribers' telephone earnings	$ 53,848.16	
Local pay station exchange earnings	150.85	
Rural telephone earnings	1,319.54	
Exchange connection earnings	180.00	
Toll connection earnings	1,398.76	
Miscellaneous exchange system earn'gs	768.34	
Toll system earnings	1,291.25	
Total operating revenues		$ 58,956.90

OPERATING EXPENSES.

Central office (traffic)	$ 11,560.16	
Wire plant (transmission)	3,950.89	
Sub-station (terminal)	3,906.01	
Commercial	3,601.50	
General	7,009.53	
Undistributed	1,833.87	
Depreciation	12,600.00	
Taxes	1,559.80	
Total operating expenses		$ 46,021.76
Net income of operating system		$ 12,935.14
Non-operating revenue—		
Profit on merchandise sales	$ 218.34	
Wiring and installation work	100.77	
Miscellaneous non-operating revenue	103.50	
Total non-operating revenue		$ 422.61
Gross income of operating system		$ 13,357.75
Non-operating revenue as a whole—		
(Interest on deposits) cash discounts	$ 305.80	
Interest on investments	102.00	
Total non-operating revenues as a whole		$ 407.80
Gross income		$ 13,765.55
Deduction from gross income—		
Interest on floating debt		$ 480.00
Net income		$ 13,285.55
Disposition of net income—		
Preferred stock dividends, 7 per cent.	$ 6,122.75	
Common stock dividends, 7 per cent.	4,000.00	
Total disposition of net income		$ 10,122.75
Net surplus		$ 3,162.80

The La Crosse Telephone Co. is making splendid progress under the efficient direction of W. F. Goodrich, its secretary, treasurer and general manager.

Albany Home Pays Regular Dividends.

The Albany Home (Independent) Telephone Co., of Albany, N. Y., has paid the twenty-second regular quarterly dividend of 1 per cent. on its stock.

Salt Lake Electric Company Buys Idaho Plant and Enters Telephone Field—To Expand Largely.

With the recent purchase of the Fremont (Idaho) County Independent Telephone Co.'s holdings, the Capital Electric Co., of Salt Lake, has entered the telephone field. Just how far the company will go into the business is not known. However, arrangements have been made to ask for franchises in a number of Idaho towns for the purpose of extending the system from St. Anthony, the central point of the Fremont county system.

R. W. Nicol, of the Capital Electric Co., when asked if his company would enter Salt Lake or Utah, said: "At this time, of course, I cannot say. One thing, however, I can say, and that is that we have gone into the telephone business to stick. Our executive committee at a recent meeting authorized me to go ahead. The Fremont system is to be extended as rapidly as possible.

"I want to say that right now is the best time ever for Independent telephone companies to be active. The time never was better, and acting on that idea we are not starting in the business blindly or for fun. There are mighty good reasons for believing the time is ripe for activity."

The Fremont county telephone system, purchased by the Capital Electric Co., has nearly 500 stations in St. Anthony and the surrounding country. The towns in which franchises will be taken offer good possibilities for the extension of the system.

The executive committee of the company authorizing the venture into the telephone business is composed of John S. Bransford, George Morgan, George Auerbach, Chester Cahoon and R. W. Nicol. There will be an incorporated company organized soon, taking in the telephone part of the company's business.

"Public Necessity" Franchise Clause to be Tried Out by Public Service Commission in Ohio.

The first case to come up before the Ohio Public Service Commission under the new law passed at the last session of the general assembly, which provides that the consent of the commission is necessary before a competing telephone company can secure a franchise to operate, was filed recently by the Gratiot & Brownsville Telephone Co., of Muskingum county, Ohio. The complainant averred that the Brownsville Farmers' Telephone Co. wanted to operate over the same territory covered by it, and set up the contention that there was no occasion for two companies and not sufficient business.

The Farmers' company was organized recently by Columbus and Zanesville capital to operate an exchange.

The company filed an answer with the commission Monday, July 24, in which it said the Gratiot & Brownsville Telephone Co. is not furnishing adequate service in the localities it reaches, but rather the service is "intolerable," and it also asserted that it was exercising its franchise prior to the passage of the public utilities law. It says consequently it cannot be estopped from operating its lines. The last question will be decided by the Public Service Commission first. H. A. Daugherty is attorney for the Farmers' Telephone Co.

Montana Independent Builds Long Distance Line.

The Hardin Home Telephone System, Hardin, Mont., is building a line into Custer to connect with that of the Montana Eastern company. This will give the local plant long distance service which it has not hitherto had. Ralph G. McComb, owner and manager of the system, states that the improvement involves the expenditure of several thousand dollars. He is a firm believer in giving his subscribers the best that money can procure, and the gratifying expansion of the system is evidence that he is doing this.

Attorney General Wickersham Declares Supreme Court Anti-Trust Decision to be Effective.

In an address at the Hancock, Mich., home-coming celebration, a few days ago, Attorney General Wickersham said, in part:

"First of all, there are the great trusts cases, in which you, in common with the whole country, have been so much interested. The government scored great victories there. Do not let anybody deceive you as to that. If the court had held that every contract that put any restraint of any kind upon commerce among the states, however slight, was a violation of the Sherman law, the Department of Justice would have had to illustrate the truth of what Edmund Burke said, 'You can't draw an indictment against a nation.' For there are not lawyers enough in the government, nor, for that matter, in the country, to draw indictments against everybody who makes any contract that in any respect operates in some measure to restrain interstate commerce.

"But when the supreme court said we must read this statute as reasonable men and give it an interpretation that will not strangle all trade, but which will prevent any undue restraint, prohibit all contracts and combinations that are intended to interfere with the natural course of trade, or which will have that necessary effect—then the court gave us a means of preventing those evils which led to the enactment of the law. And this is especially so in view of the fact that the court gave full force to the prohibition of monopolies, and by its decrees has ordered the breaking up of the two largest and most successful monopolies or trusts which ever have appeared in this country.

"But some people are saying that these decisions don't really mean anything; that the big trusts will simply reorganize under other forms and go on just as before. Don't believe any such talk. Take my assurance for it that those big combinations are going to be split up into a number of separate and distinct parts, no one of which shall have any connection or control over any other, and no one of which shall have so large a percentage of the business as to be anything like a monopoly. That is what I understand the court to require, and nothing less will meet my interpretation of the decisions of the supreme court."

Proposes that Chicago Operate Automatic System.

Herman J. Bauer, a Chicago alderman, who recently announced his intention of compelling the Chicago (Bell) Telephone Co. to give service at one cent a call, now offers the suggestion that the city take over the plant of the Illinois Tunnel Co. and operate its automatic system as a municipal plant. He proposes to seek a referendum on the question at the next election in April. Mayor Harrison is said to have remarked: "It's a good idea." Further than that he would not commit himself.

Senate to Inquire Into Sherman Act.

Following an attack by Senator Borah, of Idaho, upon the enforcement of the Sherman anti-trust law in the twenty years that it has been in existence, the Senate on Wednesday adopted a resolution offered by Senator Clapp, of Minnesota, calling for an investigation into the operation of the law, to determine what changes or amendments are necessary to make it an adequate protection against unlawful monopolies and trusts.

A. T. & T. Stock Down to 136⅝.

Following the artificial stimulation of the market which culminated in a new high level for A. T. & T. stock at the time of the issuance of $50,000,000 in new shares, the price has steadily declined. It ruled at 136⅝ on the Boston exchange this week, as against the high figure of 152 of a month ago.

Pro Bono Publico

Mr. Parsons, Father of Trusts—Monopoly Not Efficient—Economic Locomotor Ataxia

By J. C. Kelsey

John E. Parsons, aged eighty years, is the father of the sugar trust.

At the hearing before the congressional committee, he was so aggressive and so positive that his inquisitors became timid and even dumbfounded.

Such bodies usually listen with reverence to some trust representative, but the questions and the general contempt handed out to representaives of the "peepul" show a different feeling.

Mr. Parsons said that the sugar trust was formed for the general good of the public.

Pro Bono Publico again!

He did not clearly explain the benefit the public had received, but he did convey one very peculiar idea.

Some one asked, "Should the big fish be allowed to swallow up the small ones?"

Mr. Parsons said, "Little fish are fools to be swallowed by the big fish."

Bless me! if he didn't blame the government for the fact that big industries swallow up small ones.

"The government should repeal all the silly laws on the statute books and permit little fellows to combine to fight the big ones. Then you would have healthy competition and no such thing as monopoly."

Healthy competition! It's a good idea. But little American business fish are oppressed by fear. That is the trouble!

The government cannot be blamed for human weakness.

Let a big corporation make a good cash offer for stock in a small concern and all will jump for it.

When Morgan & Co. wanted Columbus, Cleveland and other Ohio points, they simply made an offer for the stock.

They did not slip in stealthily and put a crooked deal over. They simply made a public offer for that stock. And the fear-stricken stockholders jumped for the cash.

Little fish may be fools to be swallowed up, but it seems to me that most of them enjoy it.

People are so afraid of losing a dollar that any alarm will drive them into hysterics.

They can hardly be blamed, since they have been cleaned so many times.

Just as soon as a powerful concern gets control of any stock, the small investor suffers.

In Michigan Central, a magnificent railroad, minority stockholders know that New York Central has abandoned their road for Lake Shore. They want some recourse.

But New York Central has $16,000,000—and minors have $2,000,000.

Nothing to it!

Minority stockholders have no rights and courageous investors of the 1902-1906 times have learned it.

The government can do more good by giving minority stockholders quick justice than in any other procedure.

The great trouble with our republic is that we are founded on protection of property and take neither life nor happiness into consideration.

The government will send out troops to protect your physical property, but will not take a step to protect your life nor your interest in a property.

It's a grand bird's-eye view! But details are sadly overlooked.

Talking about stockholders—it reminds me of another jolt handed to American financing.

France has the richest cash reservoir in the world. Home enterprises call for less than one-fourth of their saving.

They naturally seek foreign opportunities. And be sure that we, for one, are seeking them.

The Virginia-Carolina Chemical Co. last year listed its stock on the Paris Stock Exchange. They fervently promised a dividend of 5 per cent. annually and sold their stock on that basis.

One year later, they reduced the dividend to 3 per cent.

You may imagine that was very disconcerting to the Frenchmen. Further, it caused their faith in American securities to go much below par.

It is inconceivable that men of financial standing and ordinary business sense can hand out such a deliberate smash to American securities.

There seems to be a deliberate attempt to kill off enterprise. And it is possible that this is true.

"Monopoly is not only inefficient—it spreads a contagion of mental intertia and moral turpitude.

"Monopoly, and the American financier's dream, causes profligate waste, and worse, it paralyzes enterprise. It checks the energy of production. It slows down the wheels of industry to half or quarter speed. It actually keeps the necessaries of life from coming into existence."

It may be that the attempt to queer American securities in France is part of a program of monopoly.

It is really possible.

I heard the other day of a prodigous conspiracy against the West.

The last great craze in finance was irrigation. Naturally, the promoter got his hand in and many of the enterprises of the west were crooked and caused great loss to the security buyers.

A great firm in New York failed.

It was said that the people were buying 6 per cent. irrigation bonds, and had forsaken the 4's and 5's.

Some Chicago bankers got busy with the New Yorkers. In conjunction, they went into the political mire and took a strangle-hold on the western irrigation matter.

It was worked this way: Today government bank inspectors will reject every type of irrigation bond, good or bad.

If this is true, it is outrageous.

The West is a part of our own government, yet it is said that government officials have deliberately killed the western development in this manner.

If any should cause secession, this should.

It is too devilish to be true!

Yet, as I thought of it, just such a conspiracy could exist against Independent telephone securities.

And that seems plausible.

Bell has put several Chicago bankers into power. Why should they not work to ruin Independent telephony a great deal quicker than irrigation?

Speaking of securities—there exists a concern called The Great Western Cereal Co. Joy Morton is president. But he has brought no joys to the bond-holders—nothing but glooms.

These breakfast-food people bonded their plants, then sold them for cash. To their surprise, the bond-holders wanted their money.

If I mortgaged a horse and then sold the horse, what would you do if you held the mortgage? You would very likely put me in jail.

But Joy Morton and associates are still at liberty, and further, are considered great and good men.

The bond-holders of Great Western Cereal Co. have-rights just as much as the holder of the horse mortgage, but the foxy mortgagor only obeys a "higher law."

Madam Defarge saw the child run over by the French nobleman and she knitted his name into her death roll.

That nobleman could have saved his life had he stopped and made some effort to help the child.

Even before the French revolution, there were many who foresaw the danger.

In the National Assembly they voted their privileges away. But they never stuck to the resolutions and the reign of terror went on apace.

It would be better for Judge Gary, and many lesser lights to consider the voluntary lessening of their privileges—To foreswear monopoly and cure the country of the "locomotor ataxia" caused by the present greedy near-monopolists.

If these leaders would voluntarily repent, and throw away what is presumably theirs, a wave of reviving enterprises would run their plants overtime.

But they won't risk it. They would rather "send for Charley Taft."

Poor President Taft!

Weighted and handicapped by the progeny of privilege about him, he can do nothing. And a cowardly people would not back him, even if he did something!

Monopoly seems to be in trouble, judging by the amount of speech handed out by its exponents.

Judge Gary is making some great promises. If he is allowed to go ahead and monopolize the steel business, there will be no more war.

How? They will simply refuse to sell armor plate, nor will he allow cannons, rifles and munitions of war to be made.

This is a high-priced joke!

Over 40 per cent. of the steel business is devoted to war purposes. A program of peace would shut down steel plants all over the world.

Truly we are in Altruria!

Judge Gary is not surrendering privileges. He is begging them, and, in turn, promises us peace for all time.

But I notice that Charley Schwab got a fine contract for armor plate the other day. Charley went after it himself

You know in any business deal that, when the boss goes himself, something is going to happen.

Maybe Judge Gary, when he promised peace, was thinking of Schwab's contract!

Another alarming piece of news made Wall Street tremble. Guggenheim will get mad and leave the country if he can't have Controller Bay and a monopoly on Alaska coal.

It reminds us that Marshall Field threatened to move away from Chicago if he had to pay taxes. So they waited until the great dry-goods man died and made his estate back up.

By all means, the Guggenheims should be kept here!

Old Mr. Parsons is right. The little fish are fools to be swallowed up by the big fish.

It is entirely voluntary.

Even as experienced a man as Lawyer Parsons knows that the small concern can hold out if it wants to. He knows that fear and cowardice have made the present monopolistic conditions possible. And that today the cowards are protesting and are bluffing about wanting the great properties divided up.

I believe American people prefer to be hired men and escape responsibility.

I believe the average American business man in the small town is the fellow who most over-rates the trust.

The small town business man usually is the director of the local Independent telephone company—and the Bell trust officials know it.

They have had to use popular magazines to reach him. And I am ashamed to say that they have reached some of him.

Old Mr. Parsons is right.

No Independent telephone company was ever whipped in a fight with a Bell company.

Without long distance connection, and without experience, they dotted every town with a successful business.

But because it did not pay 1,600 for 1, as did the original Bell stock, some investors were discouraged.

After discouragement came fear, and some willingly sold out to the trust.

The trust has paid good prices.

It has paid abnormal prices, if its unfounded claim is true that Independent telephone enterprise is not a success.

One of the great financial mysteries is the telephone trust. How it can get away with the prosperous appearance is hard to account for.

Nearly every licensee company it controls is a failure—from the stockholders' view.

Every Independent telephone company that sold to the trust did it voluntarily. In other words—the small fish have helped to make a trust.

The great merger talk between Bell and Independent

plants was not started from financial straits on the part of the Independents.

It was a voluntary movement.

The government cannot prevent monopoly if every small fish chooses to be swallowed by the big one.

If there is to be a telephone monopoly, blame the people —not the monopolist.

Luckily monopolies suffer from their own local and fatal diseases!

MORAL: Nature protects the public from its own folly —eventually.

Projected Independent System at Marshalltown, Iowa, on Stronger Basis than Ever Before.

To those in the telephone field who had come to believe that the attempt to establish an Independent telephone system in Marshalltown, Iowa, to compete with the Marshalltown Telephone Co., controlled by the Bell interests, had been abandoned, the following letter, signed by the new concern, the Merchants, Mechanics & Farmers Telephone Co., will prove interesting. It was printed in a recent issue of the Marshalltown *Times-Republican*. The letter, in part, is as follows:

"To THE PUBLIC: In an attempt to mislead the public, in an advertisement in the *Times-Republican* of July 1, the local management of the Bell monopoly hands out an insult to the farmers of Marshall county, and singles out President F. M. Wheeler, of the Merchants, Mechanics & Farmers Telephone Co. for personal attack for an article, the responsibility for which rests no more with Mr. Wheeler than with the thirty-four other men whose names were attached.

"Thus the old corporation tactics are being practised in an attempt to stop the organization of the new telephone company. But they have succeeded only in making the 600 and more stockholders more anxious than ever to begin the construction of their new automatic plant, which will give a county-wide service and do away with the collection of tolls, as is now being practiced by the Bell company.

"These 600 stockholders are promoters, all right, but they are not the 'get rich quick' kind, as the local Bell management would apparently like to have you believe. They are the farmers, business men and mechanics of the county, who are determined to rid themselves of the Bell monopoly, just as they have already freed themselves from the old line fire insurance monopolies, and reduced the cost one-half.

"The Bell management may make light of the claim of the new company to save the telephone users of Marshall county $20,000 to $30.000 yearly, but they cannot convince the people of their truth as long as they write their contracts for the prices which they attempted to force on the public last year, and then write across the face of the contract the old price and label it 'rate as limited by temporary injunction.' With such a system being practised it is not hard to figure out where the saving is coming from, and it will not all be on the rural lines either.

"Of course, the Bell monopoly is well known to be adverse to any form of competition, and their ability to reach the traitors in local organizations, and thus stifle competition, is recognized, and it can hardly be doubted that there is enough money wrung from the people and stored away in the Bell coffers today to purchase favorable press comment in almost any large city in the country.

"But this is the second time the people of Marshall county have felt the oppression of unlimited Bell monopoly control, and they propose this time to handle their own telephone business, and have it so organized that they will be forever free from the Bell oppression.

"If you have not already joined the Merchants, Mechanics & Farmers Telephone Co., of Marshalltown, Iowa, you should do so today.

"It is the big fight of the people against the monopolies, so join in the fight, help the cause, and get your share of the profits of the telephone business of Marshall county."

Chicago Officials Checking Installation of Illinois Tunnel System—Plant Formally Taken Over.

Experts from the office of the city electrician are now engaged in checking up the total installation of the Illinois Tunnel Co., in Chicago, to determine whether or not that concern had in service June 1 the 20,000 stations required by its franchise.

J. J. Callister, assistant to the general manager of the company, when asked regarding the matter, said:

> We have no fear of the result of the city's examination, as we know that we have more than enough telephones to satisfy the city. We sent out bills to 25,000 subscribers this week covering service for June and July. There have been numerous complaints at this office because of the double bill, but in every case where we could not send the complainants away pleased we agreed to cancel the contract. Here is a bunch of bills that represent every complaint that we did not satisfy. They are the first bills that we have sent out, and as our contracts provide for a sliding scale there was naturally some misunderstanding and confusion. We have more than 25,000 telephones installed and we have contracts for the installation of three times that many more.

The Illinois Tunnel Co. has now formally taken over the plant from the Subway Telephone Construction Co., which installed it.

Wretched Service and High Rates at Council Bluffs Since Merger Inspires Rigid Investigation.

A rigid investigation of the telephone situation in Council Bluffs, Iowa, will be started at once, the City Council and the Commercial Club co-operating. At a recent meeting of the council it was voted to request the club to appoint a committee of three to meet with the city attorney and the council telephone committee to arrange plans.

The matter was brought to the attention of the council by Dr. Donald Macrea and J. J. Hess, who pointed out that, since the absorption of the Bell plant by the Independent company, one corporation, the latter, was charging for two services, although it is alone in the field. It was also shown that the service is miserable at the present time and has been so ever since the consolidation. It is further alleged that rates have gone up beyond the franchise limitations and that the company has now become liable for the payment of a royalty to the city, as provided in its franchise.

Under the ordinance granting the Independent telephone company its franchise the company agrees to pay to the city semi-annually, when the Bell company ceases to maintain an exchange in the city, 5 per cent. of its gross earnings. As the Bell company ceased to exist in Council Bluffs on January 1, 1911, the first payment has been due the city since July 1.

Pennsylvania Bell Takes Over New York and Pennsylvania.

At a joint meeting of the stockholders of the New York & Pennsylvania (Bell) Telephone and Telegraph Co., and the Bell Telephone Co. of Pennsylvania, held recently at Philadelphia, the entire stock and holdings of the former company were sold to the latter. The New York & Pennsylvania company operated in the northern tier of counties in Pennsylvania and in parts of New York state. A majority of its stock had been controlled for years by the A. T. & T. Co., which sold it to the New York Bell when the various Bell subsidiaries in that state were consolidated. This transaction is a purely formal rearrangement of the Bell holdings.

Some Rumor, Some Speculation and Some News Regarding Telephone Situation in Arkansas.

It is declared at Fort Smith, Ark., by an official in authority that one of the greatest telephone fights in the history of Arkansas is now on between the Independents and the Bell. Pitted against the Bell interests is the Southwestern Telephone Co., of Fordyce, which has just gained the controlling interest of the Pan-Long Distance Telephone Co., of Fort Smith. "For a year," said the official, "we have been framing and planning for this fight. The time has come when the battle is on. The Southern company is well fortified with funds and advantages and the near monopoly that the Bell company has maintained so long in Arkansas will be broken."

He declared that recent purchases have increased the Southern company's control to at least 100 exchanges in the state. Of late the exchanges at Harrison, Fayetteville, Eureka Springs, Berryville, Leslie and about a half dozen others in north Arkansas have passed to the control of the Southern company. Prior to these purchases the exchanges at Mena, Ashdown, and Texarkana were bought by the Southern. The Southern's stronghold lies in the southern part of the state, where it is said it controls a majority of the telephone business.

It is stated upon good authority that the Southern company paid $150,000 for its share of stock in the Pan company concern. With the sale, both A. E. Boqua, Sr., its general manager, and A. E. Boquâ, Jr., secretary and treasurer of the company, will retire. The Pan company will remain the same organization although its officers and directorate are somewhat different. Fort Smith retains control of the board of directors, all its members being residents of Fort Smith. James F. Read became president of the company, and Judge Ezra J. Morgan, the leading spirit in the transaction, becomes secretary and treasurer. It is likely that Mr. Morgan will soon become chief counsel for the Southern interests in Arkansas.

The Pan company's capital stock will be increased to $1,000,000. Officials of the company state that close to $75,000 will be expended in and about the city for improvements. It is also said that the automatic system will be introduced. The company has tried this system at Jonesboro and has found it highly successful. It already has decided upon plans for the establishment of an underground conduit system.

The Southern company is making a vigorous fight to bring its lines into Fort Smith from the south. At Mena it has already filed suit against the Kansas City Southern Railway Co., to force that concern to allow the telephone company to string its lines parallel with the railway company's right of way. This fight is to be carried through every county between Polk and Sebastian through which the K. C. Ry. runs in order to bring the line from the south into Fort Smith.

From indications the Bell company has been expecting a fight from the Independents for some time as the Bell interests have lately become exceptionally active and have recently purchased several important exchanges in Arkansas. The purchaser of the telephone system at Conway, Morrilton, Searcy, Clarksville, Heber, Leslie, Lomoke, Malvern, and Arkadelphia, gave the name of A. L. Waterman of Mason City, Iowa, but he was reported to be an agent for the Bell people.

Recently the Bell company inaugurated a new service to northwest Arkansas via the North Arkansas Company's lines through Fayetteville. The North Arkansas Co. is allied with the Southern interests. Some time ago the Bell company entered into a contract with the Pan company, whereby the latter secures connection with Booneville, in Logan county. It is said that these contracts are in the nature of a compromise so the Bell could reach north Arkansas and the Pan reach Booneville. Eventually it is said the Bell will build a line of its own to the north Arkansas country and the Pan company will build to Booneville.

Advice is received from Pine Bluff that A. B. Banks, of Fordyce, who was in the city recently, stated that the headquarters of the Southern Telephone Co., of which he is head, may soon be removed to Pine Bluff. The company, it was stated, has property valued at $2,000,000.

Utah Development League to Raise $3,000 to Thoroughly Probe Rates of Rocky Mountain Bell.

That it may conduct a thorough investigation entirely independent of the Rocky Mountain Bell Telephone Co.'s aid and enter into every detail of the situation, the special committee appointed by the board of governors of the Utah Development League to probe the telephone question in Utah and find out why a general increase in rates is being inaugurated decided to raise $3,000 by subscription from the business men of the state.

This fund will be used to employ expert accountants and to pay the expenses of the committee incurred in their deliberations, which probably will last through several weeks.

Headquarters are established at the Commercial club, stenographers employed and an extensive study of the telephone business will be undertaken.

The members were unanimous in their opinion that the investigation should be a most thorough one, or else abandoned altogether.

At a later meeting plans for going about the task will be definitely determined. The books of the telephone company will be carefully audited to determine receipts, expenses and profits; its plants and equipment throughout the state will be appraised as closely as possible to find out how much actual capital is invested, and what is a reasonable return.

IT IS NOT GOOD for man to be isolated from his fellows. All Independent telephone men should pull together. And one of the most effectual means is to keep the field posted as to what is happening in your particular corner of it. Write us NOW, before you forget it.

American Telephone & Telegraph Co. Fixes new Rate for Conversion of Bonds into Stock.

The treasurer's office of the American Telephone & Telegraph Co. has after prolonged conference with the trustee of the convertible bond issue, the old Colony Trust Co., decided that the new rate of conversion effective July 1 shall be 126.4391. The former rate was 133.7374. The reduction follows as an automatic sequel to the new $50,000,000 stock issue. Until after July 1 up to which date bonds converted into stock had the right to subscribe for new shares, it was impossible, however, to figure the exact conversion rate. The new rate is nearly 1½ points higher than had been generally assumed on the street. The new rate simply means it will take $126.4391 of bonds to get $100 of stock upon conversion.

On July 1 the company had outstanding a total of $275,400,200 capital stock. At the fixed rate of issuance of one share of new for each five of old, this means that the new stock issue will total $55,080,040. This figure may, therefore, be accepted as the final and authoritative amount of new stock which is being offered to shareholders.

Western Bell Declares Semi-Annual Dividend.

The Western (Bell) Telephone & Telegraph Co. has declared a semi-annual dividend of 2½ per cent. on its preferred stock, payable August 1 to stock of record July 20. The dividend called for by the stock is at the rate of 6 per cent. per annum, cumulative. The company has never met its full requirements in this respect, and pays no dividend on the common stock.

Progress in the Railway Telephone Dispatching Field

Report of an Interesting Series of Tests on Selectors, by J. A. Kick—Storage Batteries as a Source of Current—D. L. & W. Telephone Department Shows Its Mettle—Readers are Invited to Contribute Personal Experiences to This Department

Report of a Test on Selector Adjustments.

By J. A. Kick.

Step by step selector mechanisms and operating relays must have a certain cycle of time constants maintained. The predetermined value of these constants represents the operating margin of the system. Disregard of the existence of this feature, and failure to carefully study the relations of the operating machanisms, produce conditions contributing to unsatisfactory operation.

After making repeated installations and carefully noting the result obtained by continually refining the method I am caused to wonder how some of the selector circuits now in service operate as well as they do, considering the manner in which they were and are now handled.

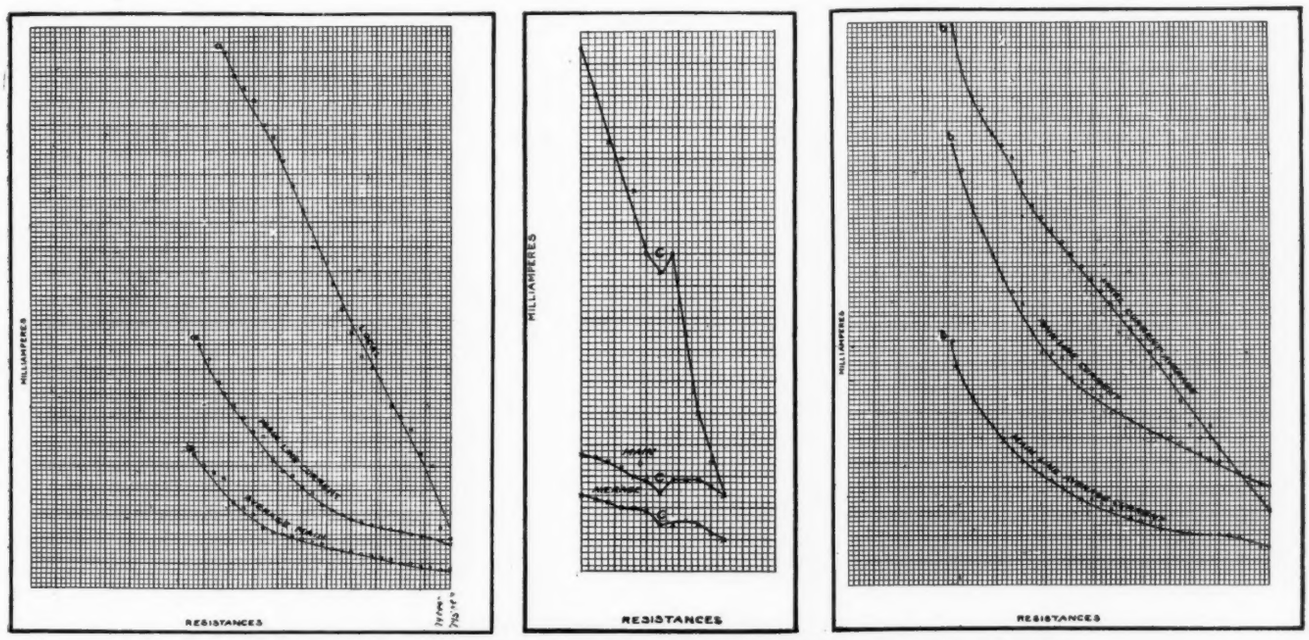
Selectors are adjusted at the factory to a high and low current margin, and if the conditions are as anticipated, with the specified current maintained, the full working margin of any type of selector should be secured.

As an example, I will take a case which came to my notice wherein the dispatcher materially increased the speed of the master selector without making other complementary changes, and the result was a shortening of the length of the impulse with failure of the current to rise to full value, and the break so short as to cause the step-up mechanism to either fail to complete its forward action or to remain in the forward position until the series of impulses were complete, of course the individual adjustment and position on the line being a factor partially governing the possible results.

There are some selector systems in which the rate of signal impulse per second cannot be materially increased, while, on the other hand, they can be retarded in action, causing another trouble due to the presence of sluggish relays in the circuit.

Each type of selector or selector system has characteristics individual to itself and each type has characteristics common to all direct current selectors or selector systems.

A series of tests with several selector systems developed some interesting information regarding the controlling factors in operation of each of the systems; and common to all was the prominent fact that the predetermined time constants must be maintained.



Effect of Varying Resistance and Adjustment Upon Selector Operating Current.

No doubt many railway telephone men are by this time well able to make a general change in the adjustments, battery and other features of the selector circuits and continue to maintain the prescribed operating efficiency, yet there are some who are continually in trouble by reason of their jumping to conclusions which result in their destroying the relation between the adjustments, time contacts and the current.

All selector systems are operative by combinations or series of direct current impulses sent to line at a predetermined speed, i. e., of so many impulses in a given time.

While some selector systems will allow of variable speed operations, yet all are designed with the various adjustments and alignments nearly fixed to maintain a relation necessary to the maximum margin of current range.

Even with the orginal installation made correctly many apparently minor and seemingly unimportant changes are frequently made by unauthorized or ill-advised parties with resultant trouble manifesting itself.

If the main signaling relay is changed, however slightly, the current conditions are changed; and a milliammeter reading in the line will substantiate this statement.

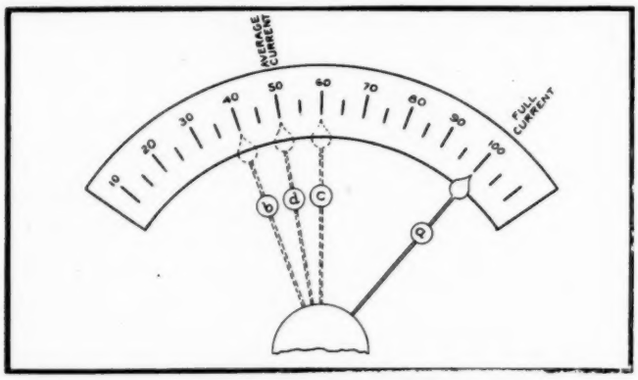
It is well known that an increase of the tension on the armature spring means that the current must rise to a higher value to start the movement of the armature. If the distance traveled is increased without changing the position of the magnet, the time constant is changed by the loss of the additional time the armature is en route.

If the distance traveled is increased away from the magnet the tension spring action is changed, as it also is if the distance traveled is lengthened toward the magnet. In other words, when the relative adjustments and time constants are perfect, no one can be changed without decreasing marginal efficiency.

Fig. 2 indicates the current readings in a selector bridge with the change of the main signaling relay indicated by the break in the curves at *C* showing conclusively the vital importance of an absolutely correct adjustment of the main relays.

It was apparent that the same adjustment of these relays will not hold for any considerable change of speed of signaling without loss of margin, especially in high speed signaling systems.

In making comparison of the margins at various speeds,



Milliammeter Pointer and Scale.

it was found that an increase or decrease of speed to a certain point produced selector failures, and that a change of adjustment of the main signaling relays would cause these selectors to again operate, while others would fail. The experiments were carried through a series of changes of speeds and adjustments, indicating that the selectors were not on the same adjustment, or else that the line was not properly graded to give all selectors the same current.

The proper adjustment of the way station selector is important, and it is easily possible to prove by a series of experiments that the selector cannot be accurately adjusted to the maximum current range without the use of a current indicating instrument.

Cases are known where lines developed leaks and so reduced the current to a number of selectors as to make them inoperative. The maintainer, instead of locating and clearing the leaks, adjusted the selectors to work on the reduced current, with the result that as soon as normal current conditions were restored these selectors had to be again readjusted.

The tension springs on relays are sufficiently unlike to make proper adjustment by position an impossibility, although this rough method is often accepted as sufficiently accurate it is nevertheless a makeshift, which is the cause of some selector troubles.

In a local battery selector the main relay may appear to function properly, but a current reading in the local circuit may disclose the fact that the relay is making too light or too heavy a contact, indicating that it is near one or the other margin in adjustment.

The above is true of the main relays at the dispatcher's station, which may appear to be on the proper adjustment although a current test may reveal a light contact, causing the current average to be too low; or a sufficient lag in the relay to cause the current average to mount too high.

Referring to the local station, Figs. 2 and 3 indicate the current range on different adjustments of the main signal relay, the curves marked *a* being plotted to the first series of readings, those marked *b* to a series of readings taken after slight readjustment of the retractile spring of the main signal relay.

In adjusting the local station selectors it is often found that the current average is not correct, due to improper timing of the contact points of the sending key at the master station, or because the main relays do not operate properly.

A test of a circuit which had been in service some time gave the following readings at the master station, indicating that the relays were very badly out of adjustment:

Current to line on closed circuit 220 milliamperes, the average current to line 65 milliamperes after readjusting the main relays the average rose to 115 and all selectors that had been failing intermittently became O. K.

Still another circuit showed a shortage of output of 25 per cent, and the average current about 25 per cent under its specified rating at the reduced output. Although no failures had been reported, the tests caused the men in charge to have the battery brought up to the requirements, the relays readjusted and the current margin improved, to prevent anticipated failures.

A third circuit was investigated with practically the same results, emphasizing the fact that intelligent installation and inspection methods are necessary to the correct and satisfactory operation of the selective signaling systems.

Fig. 4 represents the graduated scale of the instrument used to take the readings of the main signaling current at the main station and the approximate relative readings secured where the adjustments are correct.

Assuming 10 stations requiring a current of 10 milliamperes each, or a total of (*a*) 100 milliamperes, which will be indicated when the signal relays are held on the closed position, the average current will be the half-way point between the higher and lower point, indicated by the needle as it oscillates with the signal impulses.

The slower the impulses the wider the range between the higher and lower points to which the needle will travel, but the average current value will be taken as the half way point, the same as at very high speed, where the travel is perhaps within the scale distance of only eight or ten degrees.

The main signal relays may be properly adjusted and the specified full current applied to line on closed circuits, yet the current reading in the way station selectors may be unsatisfactory, due to improper action of the local circuit which operates the signal relays at the main station.

The local battery at the main station may weaken and not pull the relays up to good contact, or the contacts closing the local circuit may be poor by reason of defects, or being out of adjustment.

The individual key for any station may not make the proper contact, causing a disarrangement in the time constants in its series of impulses: This condition will be indicated by checking the average current in either the main circuit at the master station or the individual selector at the way station.

Where individual keys are used it may be found that the original adjustments have not been correct, or that they have changed in service, and that the changes are individual to each key, that is, will not be possible of calculation by length or frequency of service.

The very best method of adjustment is by use of the current indicating instrument, which, indicating the prescribed full current in the selector bridge, should indicate the proper average when the time constants are correct.

In developing high speed operation coil inductance and condenser capacity play no trifling parts, and the addition of a coil or the removal of one, in the make up of the main signaling system at the dispatcher's station may produce a very perceptible effect in the line current condition.

Recent tests made upon circuits in actual operation have brought out some new and valuable information in regard to the effect of different values of impedance and capacity in the main equipment upon the performance of the way station selectors.

The result sought by the use of this impedance and capacity is to reduce the thump of the make and break of the main battery as heard in the receiver. Without this silencing apparatus the sudden application of the voltage to the line wires will cause a quick charge of the condenser in the receiver circuit which is bridged across the line. This sudden charge in passing through the receiver causes a sharp disagreeable sound, a very undesirable result as anyone who has experienced it will attest. Also it is obvious that when the circuit is broken the stored energy of the condenser will expend itself and again make an unpleasant sound in the receiver, but it will be much less annoying than when the circuit is closed, because the voltage of the condenser is met by a counter E. M. F. from the inductance of the line and consequently will dissipate slowly.

It is a widely known fact that a coil consisting of several turns of wire upon an iron core has the power to prevent the sudden rise of the intensity of the current when the source of battery is applied to its terminals. This is taken advantage of to prevent the undesired impulse heard in the receiver when making a call on a selector line. A retardation coil of suitable design is inserted in the main battery circuit. The current to charge the condenser must pass through this coil, which prevents its sudden rise and so reduces the sudden pull on the receiver diaphragm and reduces the consequent sound. As explained above, the sound heard on the "break" of the circuit is never so sharp as on the "make." To further reduce the sound of the "make" a condenser is bridged across between the main battery and the impedance. This condenser accepts a heavy charge when the circuit is closed and further prevents a sudden rise in the intensity of the flow of current through the retard coil to the receiver circuit. It takes a condenser a definite time to charge fully on a given voltage. The sound of the make and break may be hardly distinguishable with proper values of impedance and capacity. The amount of charge of the telephone condenser will be the same as before, but the rate of charge will be decreased. It is the sudden pull-down, or release, of the receiver diaphragm that is eliminated.

But what is the result of this rounding off of the impulses upon the operation of the selector line relays?

It is seen at once that the retardation and capacity will not change the amount of the flow of current while the circuit is held closed, except that small decrease due to the ohmic resistance of the coil. But when the circuit is opened and closed rapidly at the rate of six or seven impulses per second, this impedance and capacity act in a manner somewhat as if the current were alternating in character. The study of this is therefore the study of a combination of alternating and direct current phenomena. While the current is rising and falling it is in the nature of alternating current, and while flowing steady is direct current.

With an excessive amount of impedance used the current will rise to its full value after a certain time during which the current is building the magnetic field and is much slower in its decay to a zero value. The effect of this on the selector relays is a sluggist action with only slight break between impulses. It gives the relays a slow release action, which is further augmented by the charge in the condensers tending to hold the energy of the relays bound. In the endeavor to eliminate this last trouble a sending relay was devised to short circuit the line at the instant the battery was disconnected. But it gives to the relays a further slow release action, since to short circuit an operated relay makes it slow releasing; therefore its very purpose is in the main defeated. The result when using this relay togther with excessive impedance and capacity is to give the relays a very narrow margin of variation of battery allowable at any given adjustment of the armature springs. If the current is slightly increased there will be no break and if slightly decreased there will be no make. But now if all the impedance and capacity is removed one can vary the current.

No circuit is successfully installed unless the current output, current average, selector bridge current, selector bridge average current, local current and average local current (the latter two in local battery selectors) are actually checked by meters and the adjustments made to give the maximum range.

As the line is liable to change in resistance, the main signal relays get out of adjustment or other factors contributory to the main line current change and produce a condition of small working margin, it is a good plan to have periodical tests made by inspectors who can check the current in the line and local circuits. They will frequently detect and right irregularities before they become of so serious a nature as to cause interruptions to the service, the true object of skillful maintenance work.

The Desirability of Good Main Battery in Railroad Dispatchers' Equipment.

By C. S. Rhoads, Jr.

Railway telephone equipment is maintained on a plan radically different from that followed in the maintenance of the telegraph equipment. Under the new plan repairs, replacements, tests and adjustments are made by the telegraph linemen or the telephone inspector. Therefore all equipment manufacturers are striving to produce equipment that will be lasting, and operate under a wide variation of working conditions, since it is obvious that it will not be desirable to send a man out to make adjustments when a slight variation in the operating conditions is produced.

The new policy takes the care, and especially the adjustment, out of the hands of the operators. When the current varied on a telegraph line due to a ground, leak or cross, the change in pull in the relay was compensated for by a change of adjustment to restore the proper pull. This was easily done, and required no great skill on ordinary message and dispatcher's wires. Neither was the damage great if a relay was out of adjustment. The result would be no call received, and not a false call. As it was necessary to be in adjustment to receive and transmit it followed that the adjustment was usually such that "calls" were plainly heard. A burned out adjustment was replaced by the operator. Also the cells on the locals were cleaned and recharged by the operator.

With selector, failure, whether from line trouble, improper adjustments or wide variation of the battery from any reason, results in either no rings or false rings, either of which is objectionable. But no ring is the most serious, since it interferes with the movement of trains by causing delay in raising offices to put out orders. Line troubles can be kept down by thorough inspection and good line construction. Instrument makers are producing equipment that keeps its adjustment permanently.

Then the problem is to keep the current delivered to each selector as near constant as possible to get the best results. With dry cells for main battery, this means continual test and replacement of cells. The answer is to install a source of current other than primary batteries. Storage cells with motor generator for charging supply the most satisfactory method, because of its almost constant potential under ordinary service. This perfect battery supply removes one of the most frequent causes of failure of selectors.

It is the writer's opinion that at the present time battery failure is at the root of the majority of selector failures, and that good main battery will bring uniform results with line trouble as the main cause of failure. Three or four hundred dollars spent on a complete storage and charging plant is money well spent. Dry batteries soon cost that much, and the service they give is variable and unreliable for main battery use.

Bessemer Lake Erie Orders Main Line Battery Selectors.

The United States Electric Company, New York and Chicago, has received an order from the Bessemer & Lake Erie Railroad Company for 36 Gill selector equipments, bells to be rung by main line battery; also the Gill calling keys and the telephone equipment necessary for the installation of the circuit. The same company is also furnishing for the Oregon-Washington Railway & Navigation Company 25 No. 502 Gill main line selector outfits, including the United States Electric Company's universal resistance and calling keys to operate the circuit.

Quick Restoration After Fire on D., L. & W.

At 12.30 p. m., July 13th, the railroad station at Alford, Pa., on the line of the Delaware, Lackawanna and Western Railroad was gutted by fire. Two telephone circuits, one employed for train dispatching and the other for the transmission of railroad message business; and both equipped with Gill selective signaling apparatus, entered this station, which is an important point of communication on the line.

It was important that communication with Alford be reestablished with the least possible delay and through the efforts of Mr. Joseph J. Graf, the hustling telephone engineer of The D., L. and W. system, this was accomplished at 1.55

Temporary Office—"Hustling Joe" at the Telephone.

a. m., July 14th, service on the two telephone circuits being interrupted only one hour and twenty-five minutes. The accompanying photographic view taken early on the morning of July 14 shows the station men and the linemen of the telephone department grouped about a pole near the residence of the station agent. On the pole were hastily secured the telephone and selector equipment. "Hustling Joe" is himself at the telephone reporting to his superior in New York.

Mississippi Telephone Convention Marked by Exceptionally Good Attendance.

The reports of the recent convention of the Mississippi Independent Telephone Association show an encouraging outlook for the coming year in that state. Nearly all the prominent members were in attendance, but unfortunately Dr. Givhan was unable to attend on account of illness, and W. H. Bryant on account of a lawsuit which claimed his attention in the interests of his company.

The next meeting will be held on Tuesday and Wednesday, the third week of July, 1912, at Meridian, Miss.

The subject of compulsory physical connection between competing companies came up, but no action was taken on account of the desire of the Independents to hear definitely from the Postal company in regard to an active alliance, before giving the matter of physical connection final consideration. The convention wired the Postal company of its desire to co-operate with that company in building up and strengthening a state-wide system for Independent wire service.

On Monday evening delegates sat down to what J. C. Kelsey calls "a fine spread," which anyone who has enjoyed Mississippi hospitality will understand. Candidates for the Railway Commission were invited, and their speeches were listened to with keen interest.

J. R. Bailey, the new general manager of the Mississippi Home Telephone Co., at Jackson, Miss., was a visitor to the convention and was put on the Executive Committee along with Dr. Givhan, R. H. Polk, M. L. Shannon, W. H. Bryant and W. N. McAnge, Jr., of Corinth.

Among those in attendance were: D. F. Eastman, S. J. Whyte, J. C. Kelsey, M. L. Shannon, F. L. Tool, S. M. Lewis, J. P. Caldwell, Buford Rutledge, J. D. Pitner, R. J. Shannon, J. C. McCarthy, W. L. Roberson, C. O. Davis, O. Rude, W. N. McAnge, Jr., F. W. Hodgson, R. H. Polk, J. B. Shannon, J. R. Bailey.

Alberta Government Telephone Department Completing Important Trunk Lines in Province.

The Alberta government telephone department is carrying on this summer a most vigorous construction policy, and before the snow falls 1,500 miles of new telephone cable will be added, and 800 miles of trunk line will have been completed. There has just been completed a new copper circuit trunk line between Calgary and Edmonton to handle the increasing business between these two main cities of the province, which has hitherto been borne by two local lines.

A gang is now building an extra circuit to Alix to take care of local business from Lacombe to Alix, and one to Stettler. Another gang is now completing a copper circuit from Calgary to Lethbridge. When this is completed almost perfect transmission will have been established between the four cities, Alberta, Edmonton, Calgary, Lethbridge and Medicine Hat.

A line is now being built from Brooks to Medicine Hat, and as telephone communication already exists between Calgary and Bassano, there remains but a gap of forty miles to complete the direct circuit from Calgary to Medicine Hat along the main line of the C. P. R.

From Medicine Hat to Irvine a line is being built, and when it is extended to Walsh on the boundary line of the province of Saskatchewan, the Alberta end will be ready to connect with the system of the Saskatchewan government. The Saskatchewan government has not yet reached the boundary, but it will not be long until a line will run from Edmonton through the southern part of Alberta and Saskatchewan and across the sister province of Manitoba, giving communication from Winnipeg to the Rockies, a distance of fully a thousand miles.

Ask Ohio Commission to Deny Permission to Operate.

The Brownsville (Ohio) Farmers' Telephone Co., a newly incorporated concern, is desirous of operating in Muskingum county. This is opposed by the Gratiot & Brownsville Telephone Co., which has asked the new Public Service Commission to prevent it, on the ground that two companies are not desired by the public, and that the business is not sufficient to warrant the operation of another company.

Independent Secures Hotel Contract.

The Citizens' (Independent) Telephone Co., of Grand Rapids, Mich., has secured the contract to install a private branch exchange in the Cody hotel. There will be over 150 stations installed, the switchboard and telephones to be made by the Kellogg Switchboard & Supply Co., of Chicago. The work will commence at once.

The Commercial Loading of Telephone Circuits*

This Section of the Paper Opens a Discussion of Loading from a Point of View Not Represented in Earlier Pub- Published Papers—A Concise Statement of What Has Been, and May be Accomplished by the Application of This Invention

By Bancroft Gherardi

The year 1900 may be considered to have marked the beginning of a very important period in the development of telephony. For some time prior to that date it had been known to those who gave study to the matter that the transmission efficiency of long telephone circuits would be improved by increasing the uniformly distributed inductance of the circuit. This knowledge, however, did not lead to any direct commercial results for the reason that no one was able to point out any practical method of increasing the distributed inductance of a telephone circuit without bringing in difficulties of one kind or another which were fatal.

This apparently insuperable difficulty in obtaining improved results by the use of distributed inductance directed the attention of the mathematicians and physicists to the question of whether the results sought for might not be attained by the use of inductance coils placed at intervals in the circuit instead of by undertaking to distribute the inductance uniformly along the circuit. Vaschy, Heaviside and others either suggested or unsuccessfully tested the insertion of self-induction in coils on actual lines as a means of increasing their transmission efficiency. No practical results followed from their work and no actual progress was made in the matter of using lumped inductance to improve the transmission efficiency of telephone circuits until the year 1900, when the patents of Professor M. I. Pupin, dealing with the reducing of attenuation of electrical waves were issued. Professor Pupin,[1] and Dr. George A. Campbell,[2] who had also worked on this problem, have published several papers dealing with it. These authors discuss fully the mathematical theory of improving the transmission efficiency of telephone circuits by means of placing thereon inductance coils at intervals. The papers referred to establish the fact that inductance in coils spaced suitably along a telephone circuit will produce the same effects as uniformly distributed inductance and show us how to suitably locate these inductance coils. The matter of suitable spacing the inductance coils is of vital importance and must be kept in mind because the spacing of the inductance coils is the key to the use of lumped inductance and it is from the failure to establish this fact and give due weight to it that the earlier workers failed.

I shall not undertake here to go over the theoretical ground which has already been so well covered in the papers referred to, but before describing some of the practical applications of loading to open wire lines and cables, and discussing the results which have been obtained and mentioning some of the difficulties which have been overcome, I will state the results of the fundamental work on this question for those who do not care to follow through the mathematical papers on this subject.

In the study of any telephone line, with reference to its efficiency as a means of transmitting speech, two important factors must be considered. These we ordinarily characterize as "volume" and "quality."

Volume refers to the loudness of the sound which may be obtained from the telephone receiver at the distant end of the line, and the efficiency of the line as regards this factor is determined by the ratio of the amount of energy received at the distant end of the line to the amount of energy put into the line at the transmitting end.

Quality refers to the clearness of the speech which may be obtained from the current at the receiving end of the line. The efficiency of the line as regards quality is determined by the degree that the shape of the current wave at the receiving end of the line approximates to that of the current wave impressed upon the line at the sending end. A line which would transmit all the frequencies concerned in the telephonic current with equal attenuations of all these frequencies and with the same velocity would transmit without distortion, and its quality might be considered to be perfect.

For the present I will confine my attention to the matter of the volume of speech transmitted. The formula for the attenuation of a telephone circuit, excluding the effects of terminal conditions which react on the portions of the line near the ends, is

$$\alpha = \sqrt{\tfrac{1}{2}\sqrt{(R^2+p^2L^2)\,(S^2+p^2C^2)} + \tfrac{1}{2}(SR-p^2LC)} \quad (1)$$

in which the symbols have the following significance:

α=attenuation constant per unit length.
R=resistance per unit length.
L=inductance per unit length.
C=capacity per unit length.
S=conductance per unit length.
$p = 2\pi$ (frequency).

This attenuation constant is a measure of the efficiency of the line, for on any line if the amount of current impressed on it at the sending end is known, and the attenuation constant is known, the amount of current at any point along the line may be determined by the formula

$$i = Ie^{-} \quad (2)$$

in which i = the current at any point;
I = the initial current, and
m = the distance from the initial point of the line to the point at which the current (i) is to be ascertained.

Equation (1) may be simplified somewhat by making

$$S = 0,$$

as this item S representing leakage and dielectric dissipation, is always made as small as is commercially practicable and is, in most cases, sufficiently small to be negligible in its effect upon the general result obtained. With this simplification, equation (1) becomes

$$\alpha = \sqrt{\frac{pC}{2}\,(\sqrt{R^2+p^2L^2}-pL)} \quad (3)$$

ısfactory commercial method has been suggested or devised An examination of this equation shows that the attenuation constant will be reduced as the inductance of the circuit, L, is increased. I have already mentioned the fact that no satfor uniformly increasing the inductance. The result of the work published about 1900 shows us, however, that we can obtain the same favorable effects by placing suitably spaced lumped inductance in the circuit as would be obtained from uniformly distributed inductance without the fatal difficulties encountered in endeavoring to place any considerable amount

1. Transactions of American Mathematical Society, page 259, July, 1900; Transactions of A. I. E. E., XVII, May, 1900; Transactions of A. I. E. E., XV, March, 1899; Electrical World and Engineer, October 12, 1901, page 587.
2. Philosophical Magazine, March, 1903.

*A paper presented at the 28th Annual Convention of the American Institute of Electrical Engineers, Chicago, Ill., June 26-30, 1911.

of distributed inductance. This work shows us that if more than π inductance coils per wave length are placed upon a telephone circuit the effect of these coils will be approximately the same as the effect of an equal amount of inductance uniformly distributed along the circuit. If less than π coils per wave length are placed the results are unfavorable. As the number of coils per wave length is increased above π the effect very rapidly approaches the effect produced by uniformly distributed inductance so that if as many as six coils per wave length are placed on the circuit the effect of the inductance thus placed is within 4 per cent. of that of uniformly distributed inductance. The wave length in a telephone circuit is easily computed by the following formula:

$$\frac{2\pi}{\sqrt{\frac{1}{2}\sqrt{(R^2+p^2L^2)(S^2+p^2C^2)}-\frac{1}{2}(SR-p^2LC)}} \qquad (4)$$

in which the symbols have the same meaning as in (1) above. To apply this formula to a circuit which it is proposed to load, it is necessary of course to take account of the reaction of the inductance which is to be added to the circuit in the form of loading coils, because this inductance affects the wave length. Therefore, the inductance value in the formula given above must include the proposed loading. In order that all frequencies which are of importance in connection with the transmission of articulate speech shall be cared for by the proposed loading, the frequency employed in this formula must be the highest frequency which takes a necessary part in the clear transmission of speech. It is not found that it is necessary that this spacing of the loading coils should be absolutely uniform. It is important, however, that the spacing should not depart substantially from uniformity.

Without undertaking here to give the equations dealing with the effects of loading on the quality or clearness of speech, it may be stated that it is found both mathematically and experimentally that loading makes the attenuation more nearly equal as between the different frequencies which are important in connection with speech transmission and that loading, therefore, increases the clearness of such speech and improves the quality of the line, particularly on underground cable circuits, where, on account of the relatively large amount of capacity in relation to the other characteristics of the circuit, the quality without loading is noticeably inferior on long circuits.

Broadly speaking, it may be stated that what we have done in applying loading to long telephone lines is to adopt the necessary measures to enable us to obtain the advantages of a high potential transmission system, that is, of transmitting the electrical energy from the sending end to the receiving end of the line with a high voltage and a small current as compared with the smaller voltage and higher current which is found on unloaded lines. That this is the result which we are actually accomplishing by loading our lines is shown not only from the study of the equations dealing mathematically with the propagation of telephone currents over loaded and unloaded lines, but it is also further established by actual studies and tests on working lines. We have, therefore, broadly speaking, taken the same step which electric light and power people have taken to improve the efficiency of their long lines. On account, however, of the very different electrical characteristics of telephone lines and currents and high tension electric light and power lines and currents the means which it has been necessary for us to adopt to accomplish this result have been very different from those adopted by the electric light and power engineers.

In the case of power which is to be transmitted at relatively low frequencies, usually 66 cycles a second or less, over lines of relatively short length, say, cables 10 miles long and open wire circuits 100 miles long, it is sufficient in order to transmit the energy with a high voltage and a small current to arrange the receiving end of the line by means of a transformer or otherwise so as to give a great reactance, and to place high potential apparatus at the sending end of the line. Electrically the line is so short that the reactance at the receiving end may be considered to be working directly against the high potential generating apparatus at the sending end and hence the disired result is obtained. With the telephone current, however, which is of high frequencies, and telephone lines which are often very long, the situation is entirely different. Increased reactance placed at the receiving end of the line does not make itself substantially felt at all at the sending end of the line. To obtain the proper reactance for high potential sending apparatus to work against, it is necessary, therefore, in the case of telephone lines, to distribute the reactance along the line.

The electrical characteristics of open wire lines and of telephone cables are substantially different from each other. The following table gives the constants of two typical telephone cables and of a typical open wire line:

Type of circuit.	Cable.	Cable.	Open wire
Loop resistance, ohms per mile.....	88	28	10.5
Mutual capacity, microfarads per mile	0.07	0.07	0.008
Inductance, henrys per mile.....	0.001	0.001	0.004
Insulation resistance, megohms per mile	500 +	500 +	1 to 100

The essential differences between the characteristics of these circuits, from the point of view of loading, will be seen by examining the figures in the above table. In the case of underground cable, the capacity is relatively high and the inductance, on the other hand, is relatively small. On overhead lines, however, the capacity is relatively small and the inductance of the circuit, even before it is loaded, is not negligible. The insulation of cables is constant while that of aerial lines varies with the weather conditions. On account of these differences in the electrical characteristics of these two types of circuit the design of the loading coils used on them, the proper spacing of the loading coils, and the results obtained from loading are somewhat different in the two cases. The principles employed are the same in both cases, but the different characteristics of the lines bring about in the loading different dimensions both electrical and mechanical.

The problem of loading underground cables is as a whole easier than that of loading open wire lines and will, therefore, first be discussed.

(To be continued.)

Pennsylvania Court Decides in Favor of Telephone Companies Against Excessive Pole Fees.

The Johnstown and Windeer (Penn.) Independent Telephone companies have just won an important case in the superior court in Philadelphia against the boroughs of Scalp Level, South Fork and Ferndale. The decision concerns the exactions of these boroughs of fees for the erection of telephone poles within their limits. It reverses the former rulings of the Cambria county court of common pleas, which upheld the boroughs, on the ground that the companies had agreed to abide by the restrictive ordinances existing at the time of the construction of the lines.

The superior court held in the South Fork case that the fact that the telephone companies had paid an alleged exorbitant fee for years did not militate against their claiming the benefit accuing under the act of 1905, as the license fee was not set by ordinance until one year after the passage of the act. The Ferndale authorities attempted to collect a fee of fifty cents for each pole within its territory and the company refused to pay, alleging it to be excessive and meant for revenue. In the Scalp Level case the same attitude was taken by the superior court and the prior rulings of the lower court were reversed. The decision will have a far-reaching effect.

The Telephone Rate Situation in Los Angeles

A Fair Municipal Public Utilities Board, Headed by a Man of National Reputation, Sacrificed to False View of Political Expediency by an Erring Council—Meyer Lissner's Declaration of Principles—Local Conditions Reviewed by Kempster B. Miller

Meyer Lissner and his associates on the Board of Public Utilities of Los Angeles resigned on June 30, 1911.

The board had twice presented a schedule of telephone rates to the city council, upon the recommendation of honest and capable experts of national reputation. In both instances the council, apparently in response to misguided and ignorant public clamor, and unintelligent and sensational newspaper articles, turned down the recommendations of the commission. The result of its first attempt was a law suit, and it is now floundering in the maze of difficulties of its own creation, beset by vociferous citizens on one side, and in fear of certain defeat if it rests its case with the courts.

Meyer Lissner.

The position of the board is fairly stated in the following abstract from the letter of resignation submitted to Mayor Alexander:

"None of us sought appointment as members of the Board of Public Utilities. It was urged upon us as a matter of civic duty, and in that spirit we accepted and gave freely of our time and service, without compensation, at considerable personal sacrifice and inconvenience. We have employed the best available expert help in getting at the facts on which to base rates. We have tried in all sincerity to be fair both to the public and to the companies in all matters pertaining to the operations of public utilities in this city. It appears that our course has not been satisfactory to yourself, and it has not received the support of the City Council, and we therefore cheerfully withdraw."

The fair and enlightened attitude in which the board approached and dealt with the question of rate regulation is told in the following address by Mr. Lissner, which served as an introduction of Kempster B. Miller to the Los Angeles City Club, of which Mr. Lissner is president, delivered while he was still president of the Board of Public Utilities. It is followed by an abstract of the informal, extemporaneous talk given before the same club by Kempster B. Miller, who had spent several months in Los Angeles investigating rate questions for the city attorney, and Board of Public Utilities.

"Gentlemen: You remember that the Board of Public Utilities last year, after an investigation made by the telephone expert of the Wisconsin Railroad Commission, Mr. Sloan, recommended certain rates for telephone service for the ensuing year. You remember that the council saw fit to disregard our recommendations and adopted other rates, lower than those we recommended. One of the companies, under protest, acquiesced in the ordinance and collected the rates prescribed; the other, the Pacific (Bell) company, took the matter into court and securing an injunction against the enforcement of the ordinance and the collection of the rates prescribed, the court ordered that the company might collect the old rates, which were higher, and impound the difference between the old rates and the rates fixed by the council, to await the result of the action. The city attorney was instructed to defend the action on behalf of the city, and at his request was authorized by the council to find and employ the most competent available expert for the purpose of trying to make a case on behalf of the city.

"The city attorney made an independent search for a telephone expert and selected the speaker of the day. The hope on the part of the council and the city attorney was that Mr. Miller's report might justify the council's rates.

"After a number of months of careful investigation, Mr. Miller's report when made showed that the rates fixed by the council for the Pacific company would only give them a net return of less than 1 per cent. on the physical valuation of their property, and, of course, on that showing, although the city has not finally acted in the matter, and the court proceeding remains in statu quo, we all know that the city will not be able to make out a case in court, and eventually the case will have to be dismissed, so far as the city's defense is concerned, and the moneys, something like $50,000 impounded in court by the company will have to be returned to the company, which will be permitted to keep that amount; and the city is also out, or, rather, has had to expend a number of thousands of dollars for the investigation made by Mr. Miller for the council and the city attorney's office.

"After Mr. Miller had concluded his report for the council and the city attorney, he was available for the purpose of the Board of Public Utilities. We had made no independent investigation this year, because the matter was all up in the air, so far as we were concerned. We were justified in resting the case where we submitted it last year. But all of the data and information that Mr. Miller had secured in a number of months of very careful work was at our service, and at a very small expense, comparatively, we had the benefit of that and such further investigation as Mr. Miller could make within the last ten days or two weeks, in order to recommend rates for the following year, which he has done. The rates suggested by him have been adopted by the Board of Public Utilities and are now before the people.

ATTITUDE OF UTILITIES BOARD.

"Before introducing Mr. Miller, I want to say on behalf of the Board of Public Utilities that, of course, we would rather lower a rate for any public utility than to raise one. It isn't a pleasant thing at all to have to suggest a raise in rates. *But after we have made careful investigation and found, on the basis of the physical valuation of the property and the returns that the company is receiving, that it only receives a fraction of the minimum net earnings it is legally entitled to, it is just as much our duty, I take it, to fix a rate that will give the company at least a living percentage on its investment, as it is to reduce a rate when we find that charges are excessive.*

"If we didn't have the courage to do that, gentlemen, we wouldn't be fit to hold our positions and our work wouldn't stand. For example, if we would reduce rates for the telephone companies this year in the way the council did last year, the result would undoubtedly be further litigation. The matter would again be thrown into the courts. The citizens who paid for telephone service would again have their money impounded in court, and eventually the money would have to be re-

turned to the companies, and the city would be up against it again; a state of demoralization which it isn't pleasant to contemplate.

"Now, if we are going to have regulation of public utilities at all—and that we must have—we have got to give the companies, as well as the people, a square deal. And that has been the aim at all times of the Board of Public Utilities of the city of Los Angeles."

Says Los Angeles Is Still the Telephone Marvel.

In his talk before the City Club of Los Angeles, Mr. Miller dealt with the rate question and several other topics bearing upon the telephone situation, saying, among other things:

In 1886, twenty-five years ago, Los Angeles had 218 telephones. In 1897, fourteen years ago, the number was 2,500. In the beginning of 1904, only seven years ago, an enormous increase had taken place, bringing the total up to 15,020.

About the middle of 1904 the Home Telephone Co. entered the field. As I recollect it, they had about 4,000 telephones when they opened up about April, 1904. In the middle of 1904 there were probably about 18,000 telephones altogether operating in this town, seven years ago.

Today, or at the first of this year, there were over 80,000 telephones in this city. That means that there is a telephone for every four people. It means there are twenty-five telephones for every 100 inhabitants. Such a development is unheard of anywhere in the world, so far as I know.

To show you what this means in the way of telephone business, telephone traffic, I will say that there are about 750,000 calls made in Los Angeles daily. That means over two calls per day for every man, women and child in this city.

Summarizing rate history, I will say that until about seven years ago, with a single company in the field and with a relatively small telephone development, rates that were in the aggregate much higher than at present were charged, the Home company coming into the field in 1904, started with rates about half those charged by the old company. Since that time, in spite of the unparalleled growth of the two companies, there has been, partly due to competition and partly to ordinance requirements, a great reduction of the old company's rates.

Just to give you an idea of what has happened in recent years in other places, I will say that New York City during 1908 put in more telephones every six months, added that many more to its plant, than it had in the whole first seventeen years of its existence. Every six months they added more telephones than they had at the end of seventeen years. Chicago's experience is similar. This city is much worse—or better, whichever way you want to look at it.

Service.

Let us look a little into the matter of service. In 1904 the single company that was then operating here had about 15,000 telephones, and a great many of them were on that abominable thing for city service, a 10-party line. They were charging for 10-party line business telephones $2.50. For 10-party line residence telephones, $1.25. I can speak with direct knowledge of the situation here then.

From the bad service that existed here in the early part of the last decade, shortly after 1900, there has been very great improvement.

I mention that thing in passing, to bring out a lesson that I think should be taken to heart. Telephone investigations almost always are made on the basis of how much it costs, and people do not seem to realize that there is just as much difference in quality in telephone service as there is in price.

It is interesting to note, in connection with this service matter, the tendency of the times with regard to the use of the various grades of service. Take a rough analysis of the Pacific company's business: For 1906 I find 1,535 single party business lines; 3,924 single party business telephones today. On the 4-party there were then 1,827; now 526. The number of 4-party business telephones since 1906, you see, has been quartered. With the residence telephones it is even worse—or better. Then there were 772 1-party residence in the Pacific company; now 3,244. There has been a great increase in the 2-party business, which is a good class of service—then 700; now 6,079. There has been a falling-off in spite of the great net gain of the company, in the 4-party residence—then 14,261; now 11,116. Of 10-party residence telephones there were, even as late as 1906, 350 left. They have all disappeared. There is, therefore, a tendency among the telephone-using public, toward the use of the better grades of the service offered.

That is not the only sign of the times that we can see. A few years ago, when state and municipal investigation and regulation of public utilities were brought so strongly before the public, the public service corporations couldn't see it with a telescope. They ridiculed it. They didn't propose to stand for it. Today they have seen the handwriting on the wall. They are either gracefully or otherwise submitting to it, and I think they are beginning to realize that intelligent, fair regulation is a good thing for the company as well as for the public.

Rates.

The rates that have been proposed by me have been prepared with extreme care. I found that some of the classes of service here that were sold the cheapest were costing the most. Some of the so-called sending lines that now operate in drug stores and banks, put in the most attractive surroundings, where they invite free use by the public, have been costing less, much less than the average business man is paying for his telephone. What was the result? Some of those lines show 49 calls made over one line in one hour. To handle traffic like that costs money. Who is paying for it? Not the person who subscribes for the telephone, because he is paying only $4 a month for it. It's the dear public, the other subscribers, who pay. Quite a number of these lines were measured up carefully, with the result that they show 109 calls average per day; and if I didn't have pretty good faith in the man that made those observations, I wouldn't believe it.

RECIPROCITY is a fine thing, not only academically, but practically. You derive some pleasure and profit from reading what is happening in other places, why not send us news items concerning yourself, your plant, your neighbors and their plants? That helps to give the other fellow similar pleasure and profit.

Important Pennsylvania Independent Refuses Bell Offer and Renews Contract with Tri-State.

By a contract just signed between officials of the Big Redstone Home Mutual Telephone Co. and the Tri-State Telephone Co., at Uniontown, Pa., the former will be connected exclusively with the lines of the Independent company for the next five years. The Big Redstone company operates in Washington, Perry, Jefferson, Redstone and Menallen townships and has practically a monopoly in its territory.

The Big Redstone company has been interchanging service with the Tri-State lines for some time, the contract expiring on July 1. Since that date, pending a renewal of the contract, the service has been discontinued. The Bell Telephone Co. made strenuous efforts to secure the contract, but its terms were rejected and the old arrangement perpetuated for a longer term than formerly. The contract was signed by George C. Allen, president, and Elmer E. Hazelbaker, secretary, of the Home Mutual, and by A. M. Crichton, division manager of the Tri-State. The latter corporation is a part of the system of the American Union (Independent) Telephone Co., which has headquarters in Philadelphia.

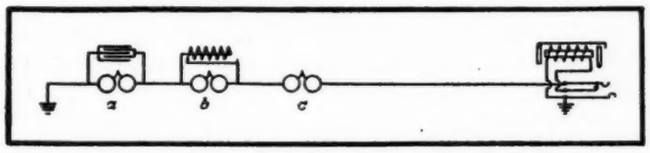
Construction and Operation of Party Line Bells

A Condensed Review of Some of the Principles Which Have Been Employed in Attempts to Give Selective Ringing Telephone Service—Fundamental Idea of the Harmonic System—A Clear Exposition in Simple Terms of the Combination of Electrical and Mechanical Tuning Which Prevents Interference

By H. P. Clausen

To those who have observed the evolution of the party line telephone bell, particularly the development of the harmonic ringer, the study of the problem of rendering selective service is always an interesting one.

The first party line bell consisted of an ordinary low wound, polarized ringer, with the different stations connected in series. Code ringing was, of course, necessary with this type of system. After experiencing the operation of such bells upon



Series Line—a, With Condenser; b, With Non-Inductive Resistance.

longer lines, the necessity arose for developing a type of bell which would not retard the voice currents as much as the old bell. Condensers were cut across ringers, as well as non-inductive resistance coils, without producing any great improvement. The bridging bell was then developed, and today is practically the only type used.

However, the plain bridging bell system, as originally developed, did not permit more than a two-party selective service—that is, subscribers' bells were connected from each one of the two line wires to earth. This permitted of signaling over one of the line wires to the exclusion of the other, and therefore, produced a two-party selective system.

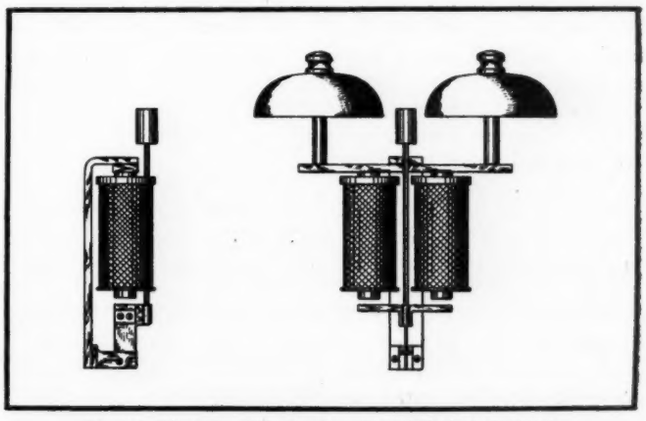
The direct current bell, or, as it was better known, biased ringer, was then introduced, and it was found that a four-party selective service could be given with a fair degree of satisfaction. This system of selective signaling is usually known as the "plus and minus" selective bell system, and, while this was not applied to practical service in this country to any great extent until shortly after 1890 the system appears to have been used in France some time prior to 1884. Upon the advent of common battery exchange operation, and with the development of high tension transmission of current for electric light and power, however, the biased ringer lost a great deal of its usefulness.

Thoroughly understanding the difficulties and the + and — system, inventors managed to produce a system of party lines in which the signaling current used was of different frequencies, and alternating in character. One of the successful systems consisted in connecting a ringer coil in series with an impedance coil and a condenser. The adjustment of the impedance and the condenser was such that the 20-cycle current operated the ringer successfully. But if an attempt was made to project a 60-cycle current through this series combination, the impedance was sufficiently high to prevent enough current to operate the ringer from passing through it.

It now remained to produce a signal bell which would respond to the 60-cycle current and not respond to the 20-cycle. This was accomplished by connecting an impedance coil in parallel with the ringer movement, and a condenser was then placed in series with the parallel combination. The 60-cycle current, upon being projected through the combination, properly operated the ringer. The parallel connected impedance coil forced the larger amount of 60-cycle current through the ringer windings. As stated before, the 60-cycle current would not affect the 20-cycle bell. Now, upon attempting to project the 20-cycle current through the 60-cycle bell combination, the impedance coil did not offer any more resistance to the passage of the 20-cycle current than the ringer movement, and with a condenser of less than .4 m. f. capacity, not enough 20-cycle current passed through the ringer to operate it, for the available current divided itself equally between the ringer and impedance coil. With this type of selective system, a two-party metallic service was obtained; and a four-party service, by ringing to ground.

Another group of inventors set to work upon the idea suggested by some unapplied inventions made many years prior, and based upon the fact that different length pendulums, when set in motion, oscillated to and fro at different frequencies, depending upon laws well understood. Upon attempting to apply the pendulum type of ringer to existing conditions, one of the greatest difficulties consisted in securing machinery for delivering an alternating current of certain frequencies and delivering such frequencies continuously without variation. A manufacturer finally succeeded in producing a machine which delivered alternating currents of four different frequencies, and applied a regulator upon the machine which prevented more than a 5 per cent. variation in the frequency. This was the opening wedge for the development of the harmonic ringer of today.

The best known systems of harmonic ringers operate upon four frequencies, which, curiously enough, were made multiples of each other, viz., 16 2-3, 33 1-3, 50 and 66 2-3 cycles. The expression, "frequency," is, of course, applied to the number of oscillations per second, and may be better explained by stating that the alternating current produced by a two-pole armature revolving between the fields of a two-pole dynamo at



Biased Ringer, with Spring-Controlled Armature.

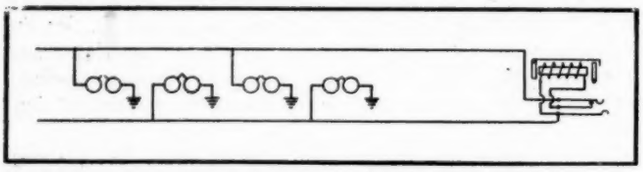
the rate of 1,000 revolutions per minute causes 16 2/3 cycles of current to be delivered every second from the windings of the armature.

The reason for the frequencies being multiples of each other lies in the fact that, if one has a generator driven by a motor, it is most practicable to make the bells operate upon such frequencies as will permit driving each of the four current generators from the same motor shaft. Therefore, the 33 1/3-cycle generator is a four-poled machine, driven at 1,000 R. P. M. This machine will deliver current at twice the frequency of a

generator having only two poles. The third machine is provided with six poles, thus producing the 50-cycle current, and, naturally, in order to produce the 66 2/3-cycle current, the fourth machine must be equipped with eight poles.

It is due to this convenience of arranging the generators that the standard frequencies bear the harmonic relation toward one another, and not through any necessary characteristic of the harmonic ringer. In fact, the reverse is probably true. If the frequencies were not multiples, one of another, it is possible that regulation of the machines might be given a somewhat greater margin of variation.

However, since current generators of the pole changer type have been successfully developed, the matter of frequency is

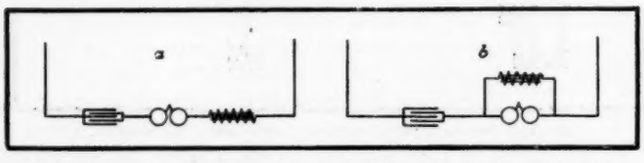


Bridging Line, Grounded Ringers, for Two-Party Selection.

merely one of convenience, and, while there is no good mechanical reason for retaining the old multiple relation of frequencies, there are several good business reasons for maintaining them on account of the standardization of operation tendencies of operating companies.

As a matter of fact, it appears that the most satisfactory plan of selective machinery installation is the one in which the current required during the very "busy" portions of the day is generated by machines driven by a motor. Then, during the "not busy" periods of the day, the pole changer equipment may be used as an auxiliary, and this is an additional reason for retaining the multiple relation of the frequencies, for, were this not done, it would be necessary to have four separate sets of motors and dynamos for delivering the current during the busy portions of the day.

Before discussing the character of the currents required, a few moments may be spent upon the construction of the signal bells. If the ordinary polarized bell, provided with a long tapper rod, such as is generally used upon bridging work, be connected to a source of alternating current, it will be found that the armature and, necessarily, the tapper of the ringer, respond to quite a range of frequencies. One may drive the generator to produce, say, 5 or 10 cycles of current, and operate the ringer. Again one may drive it possibly as high as 40 cycles and still obtain a satisfactory signal, but, if the frequency is increased much above this point, the armature will fail to respond, and the signal will be of the intermittent or broken up character, this, of course, being due to the fact that the armature and the attached tapper rod are not connected so as to vibrate in perfect unison with the current. One may shorten up the tapper rod, and, after doing so, find



Low Frequency Station (a), and High Frequency Set (b).

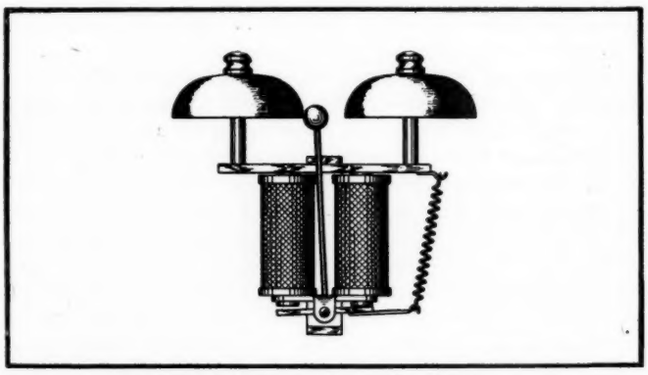
that the ringer responds to still higher frequencies. If the experiment should be directed the other way and a weight attached to the tapper rod, it would be found that one could adjust the ringer so that it would respond perfectly to current, say, below 20 cycles.

It will be observed that in the designing of the harmonic ringer, the special object is to construct the signal device so that it will respond best to certain frequencies.

The lowest frequency bell used today in harmonic service is adapted to operate upon a current of 16 cycles per second. The tapper rod of the 16 cycle bell is made very heavy. The armature is supported, not on pivots, but upon a spring, usually quite thin; and sometimes, though not necessarily, the low frequency ringer spring is longer than any of the higher frequency bell springs, so that it will absorb the higher frequency oscillations without causing the heavily weighted tapper to respond.

This is the purely mechanical theory of operating harmonic ringers, for, when one is obliged to construct a 33-cycle ringer, the weight of the spring is slightly increased and the weight of the tapper rod decreased. Increasing the weight of the spring decreases the liability of the low frequency current to start the armature of the 33-cycle ringer into motion, while the weight of the tapper is decreased purely for the purpose of saving power in operating the ringer. The low frequency current will not operate the 33-cycle bell if the spring is of a proper stiffness, and the weight being less produces a different rate of natural vibration, and therefore tends to prevent the low frequency current from operating the 33-cycle ringer or any of the higher frequency ringers.

This is the mechanical diffeence which must be noted in discussing the 16- and 33-cycle ringers, but there is an electrical difference also, this being introduced by utilizing the advantages which may be obtained through limiting the amount of current which may pass through the respective signal bell equipments. The 16-cycle current, it is now understood, will not operate the 33-cycle bell as readily as it will operate the 16-cycle bell,



A Simple Form of Harmonic Ringer.

for the reason that the weight of the spring in the 16-cycle ringer, combined with the tapper rod of the same ringer, produces a natural vibratory period nearly in synchronism with the 16-cycle current.

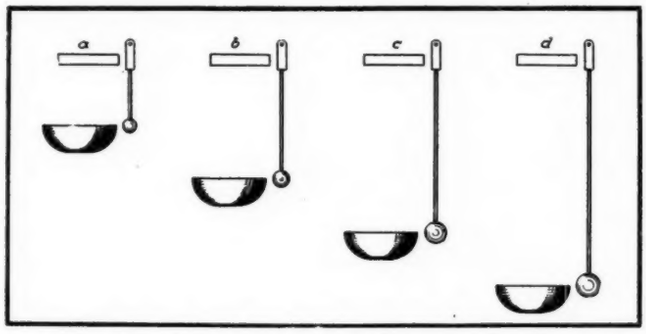
The relative weights between the tapper and spring of the 33-cycle ringer, however, are not such as produce a condition of synchronism with the 16-cycle current after it has been adjusted to operate best upon a 33-cycle current. If one now adds to this condition of difference between the two equipments a lower voltage for operating the 16-cycle ringer, that is, lower than the voltage of the 33-cycle current, then it is obvious that, inasmuch as the 16-cycle bell is mechanically tuned to suit the 16-cycle current, and whereas the 33-cycle bell is not favored in this manner, it must become still more difficult for the 16-cycle current to operate the 33-cycle bell.

In addition to the difference in voltage, and the difference in mechanical tuning of the ringers, there is another very important feature, that is, the electrical tuning of the combination, for it is a well understood phenomenon that, when an alternating current of a certain frequency is projected through the windings of an electromagnetic device connected in series with an electrical condenser, there is a certain capacity which will permit the greatest possible amount of current passing through the combination.

When one takes advantage of this condition by varying the

capacity of the condensers, or the impedance of the ringers, it is obvious that the 16-cycle ringer can be made responsive in a surprisingly greater degree to a 16-cycle current than to any other frequency, for, when one has the combination of mechanical and electrical tuning, all elements will tend to prevent a given signal bell from being operated by any other frequency of current than that to which it has been adjusted.

Another very important feature of the selective telephone is the micrometer adjustment of the gongs toward the tapper



Pendulum Movements, Different Rates of Vibration.

rod. This adjustment should be considered in connection with the suggestion that all stations connected to a party line respond, in a degree, to all currents projected over the line, and only the station which it is desired to signal will respond to a noticeable degree. The micrometer adjustment will permit moving a gong towards the tapper which is fastened to the armature of the ringer, so that it will be just at the end of the stroke of the tapper when the instrument is operated. Assume that a 33-cycle current is sent through a bell intended to operate upon this frequency. In moving the gongs far enough away so that they may not be struck by the tapper, one may project the current through the ringer combination and find that the tapper oscillates back and forth, generally with an almost unnoticeable noise. Upon causing the gongs to approach the moving tapper, it will be found that a point is reached where the tapper just strikes the gong, and produces the required signal.

Now, let a 50-cycle current be sent through the bell at the same adjustment, the tapper rod again oscillates, but does not travel far enough to allow it to strike the gong. Upon sending through a 16-cycle current, the same conditions prevail. The tapper rod will oscillate in a noiseless manner, but will not move far enough to permit it to strike the gong. Now, if one adjusts the gongs improperly by forcing them farther toward the tapper, it will be found that not only will the ringer respond to the 33-cycle current, but it will also respond to the 16-cycle current. This shows the importance of adjusting the gongs perfectly, and also the importance of being enabled to move the gong from side to side in very small steps, which, of course, is best accomplished by the micrometer adjustment.

In conclusion, it may be well to briefly summarize both mechanical and electrical effects utilized in the construction of harmonic ringers in which a given station equipment will not respond noticeably to the current projected over the same line circuit and intended to operate another station connected with the same line.

1. For signaling the stations, alternating currents of different frequencies and voltages are used.

2. In order to reduce the liability of lower frequency current operating any of the higher frequency bells, this current is projected at a reduced voltage.

3. In order to permit a lower frequency current to operate the low frequency bell, the armature of the ringer is supported by a thin, flexible spring, for the armature so supported is more likely to be set into vibration by a slowly alternating current than would be the case were it supported by a heavier spring.

4. In order to make the lower frequency bell more responsive to the lower frequency than to the higher frequency current, the tapper rod supplied for the low frequency bell is of considerable weight, that is, heavier than the tappers of any of the higher frequency bells, and of such weight, and placed in such a position upon the tapper rod, as to freely and naturally oscillate as nearly as possible in unison with the oscillations of the lower frequency current.

5. The lower frequency station equipment may be made to pass a larger amount of current than the higher frequency equipment, when subjected to the low frequency current, through installing a higher capacity condenser in series with the low frequency ringer—this capacity to be higher than that which is connected in series with the ringer intended to operate upon the higher frequency, always assuming that the electrical impedances of the ringer magnets are equal.

6. With the capacity of the condensers of the two stations equal, the impedance of the low frequency ringer may be made so as to permit the passage of the largest amount of current through the low frequency station equipment while subjected to the low frequency ringing current.

7. The gongs of the ringer may be so adjusted that, while the higher frequency current may oscillate the low frequency ringer armature, these oscillations cannot be sufficiently great as to allow the tapper to strike the gong, and thus produce a noticeable signal.

Finally, the mechanical elements of the selective ringer are so arranged that the lower frequency ringer movement absorbs the higher frequency currents without permitting the tapper being operated to a sufficient degree for striking the gong of the ringer, and it is so arranged that the weight of the tapper rod, in combination with the spring supporting the armature, is made responsive to oscillations of a certain frequency. Electrically, the currents are projected at different frequencies, and the low frequency current is projected at the lower voltage, and therefore less liable to affect the higher frequency bell. The relations between the impedance of the ringer and the capacity of the condenser are such as will result in the passage of a larger amount of current through a given station equipment when it is subjected to the signaling current designed to operate it.

With respect to probable future developments in the design of harmonic selective party-line systems, it appears imperative that the voltage be equalized and that none of the bells shall require over 100 volts pressure to successfully operate it. In order to bring down the highest voltage used today, this will mean a reduction of practically 45 per cent. As a matter of fact, experiments have been made and successful results obtained. With an applied voltage of 80 to each of the four stations, this result being accomplished by a shifting in the winding of the ringers and a modification of the capacities of the condensers.

The above suggestions, however, should not be construed as indicating that the harmonic ringer systems, as designed today, do not operate satisfactorily, for the reverse is true, and little improvement need be looked for or even desired in the selective qualities of the ringers; but, it is obvious that it is desirable to reduce the ringing current to something under 100 volts, if only for the purpose of protecting the cable circuits and avoiding the unpleasant results of having a 66 cycle current at 185 volts passing through the user's or maintainer's person.

PROBLEMS IN CONSTRUCTION, operation and what not arise daily. TELEPHONY is here, ready and anxious to be consulted. Look him over as he appears in the "E-Motion Pictures." Rather a capable appearing sort of chap, isn't he? Call on him. He'll solve your troubles.

Telephonitis—Can Some Doctor Find a Cure for It?

Some persons are skeptical of what they term new-fangled disease, says the Baltimore *Sun*. They listen with cynical smiles to tales of the hospital, of operations and typhoid. They consider appendicitis a myth, exercise fatal and fresh air a deadly poison. But when it comes to that weird malady—telephonitis—they unanimously admit that it not only exists, but rages.

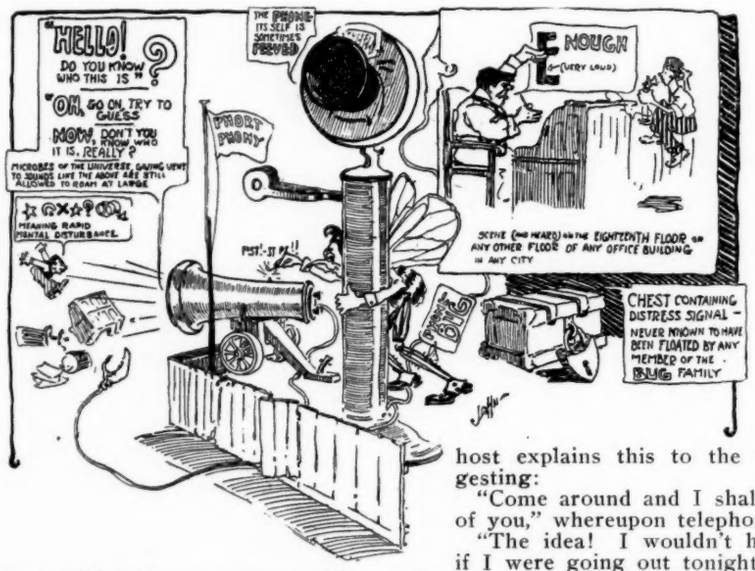
One extraordinary thing about telephonitis is that everybody recognizes the symptoms except the person with the diseases. The possessor of a telephone, not even stopping to think, can count off a dozen or more who are infected with telephonitis. Merchants having public telephones claim that half the human race has been bitten by the microbe. And worse than the patients not realizing their condition is the fact that this disease has so far proved incurable.

Another remarkable thing is that telephonitis does not trouble the persons suffering with it. They revel in their misfortune. Those who suffer from telephonitis are the real victims. When smallpox is discovered in our midst, we can all be vaccinated and escape. The good doctors offer now to shield us with serum from the deadly typhoid germ. But the man we shall rise up and call blessed is he who will tell us how to protect ourselves from telephonitis.

Every telephone renter has a mild attack of near-telephonitis when the instrument is first installed in the house. He pores over the telephone directory, searching for names of persons he knows sufficiently well to call up. For several days he converses at random over the wire with friends and acquaintances, much to his own enjoyment and their annoyance, indeed perplexity, some of them pondering:

"What on earth possessed that fellow to call me up?"

This is the child-with-a-new-toy stage, which usually rights itself within a week or two. Indeed, this phase is but a distant cousin of real telephonitis, and is only dangerous in that, while in this highly susceptible state, one may readily contract acute telephonitis and become a hopelessly chronic case.


"HELLO! DO YOU KNOW WHO THIS IS"?
"OH, GO ON, TRY TO GUESS"
"NOW, DON'T YOU KNOW WHO IT IS, REALLY?"
MICROBES OF THE UNIVERSE, SAVING WHAT TO SOUNDS LIKE THE ABOVE ARE STILL ALLOWED TO ROAM AT LARGE
MEANING RAPID MENTAL DISTURBANCE
THE PHONE ITS SELF IS SOMETIMES AFFECTED
FRONT FRONT
PST-ST PST!!
"NOUGH" (VERY LOUD)
SCENE (AND HEARD) ON THE EIGHTEENTH FLOOR OR ANY OTHER FLOOR OF ANY OFFICE BUILDING IN ANY CITY
CHEST CONTAINING DISTRESS SIGNAL — NEVER KNOWN TO HAVE BEEN FLOATED BY ANY MEMBER OF THE BUG FAMILY

"Hello, do you know who this is?"

The person who opens a telephone conversation with such a greeting is generally suffering with telephonitis, perhaps only incipiently. There is still hope for him.

"Oh, go on, try to guess."

If this is the second remark, it may be set down that the case is well developed. Hope here becomes but a ray.

"Now, don't you know who it is, really?

When he attempts this, there is no further doubt. His is an advanced form of the disease, entirely incurable, highly malignant and vicious. The person with such a degree of telephonitis should be isolated, but, unfortunately, there is no way to do it, and he is allowed to run at large, wholly unrestrained.

But when he continues:

"I believe you are just pretending you don't know me because you don't want to talk to me," please don't pull the telephone from the wall by the roots. The proper course is to gently hang up the receiver and refuse to answer a call in the next half hour. By that time the telephoner will have become discouraged and called some other victim. It is immaterial to him whom he calls just so he talks to some one. Destroying the telephone, while immensely soul-satisfying, is expensive and will not ruffle the telephonitis person in the least.

There are those who labor under the impression that the telephone is designed to foster social conversation—to keep it perpetually on tap, so to speak. They think the renter of a telephone is not getting his money's worth unless the lines is kept red hot, and they stanchly refuse to stand by and see a friend defrauded. At any hour of the day or night they call up merrily:

"I didn't have anything else to do, so I thought we could have a cozy little chat."

A brave person will instantly respond:

"I am sorry I cannot talk to you now, but I am very busy."

Alas, that brave persons are so few! The victim makes a polite inanity in reply, pawing the earth while the person with telephonitis drags along a fifteen-minute talk on subjects that interest the callee not a particle. If a caller comes in person when one is up to the ears in work, it is hardly necessary to explain that pressing duties preclude conversation, but over the wire it is difficult not to sound churlish in making a similar explanation.

The telephonic person goes on to say that he can chat so much more comfortably by wire than by actually calling.

"I have an electric fan over my head," he says, "and the telephone is right by my couch, so I don't even have to sit up. I tell you this is solid comfort."

And the craven coward at the other end prates, "That's fine," or "I envy you," instead of frankly objecting:

"Well, old man, I'm hanging over a wall telephoning in a dark, unventilated corner of the hall. There is a buzz of conversation in the next room that makes it next to impossible to hear you. I'm in the path of persons going in and out and I'm on my way to keep an engagement anyhow, so you will have to excuse me."

Sometimes one is entertaining a visitor when the free-lance call comes in and the host explains this to the telephonitis person, suggesting:

"Come around and I shall be glad to talk to both of you," whereupon telephonitis says, coldly:

"The idea! I wouldn't have called you up at all if I were going out tonight."

In the foregoing "he" is a concession to the rules of grammar, through an unfortunate oversight there being no common singular pronoun, but "she" answers quite as well, if not better, to represent the person suffering with telephonitis.

The worst form of the disease is that which induces a girl to telephone a man at his place of business whenever she is in the mood for a little chat. What girl would drop into a man's office to pay him a social visit? But few feel any hesitancy about telephoning just to talk to a man when his time belongs to his employer.

Called on the telephone during business hours, the man in a subordinate position is between two fires. If he says "I can't talk to you now," he will get a frost the next time he sees the girl. If he holds up his end of the conversation, some one in authority is apt to call him to account for neglect of duty. So what is he to do? He ought to have the courage to explain that he is not a member of the firm and, therefore, has not the privilege of alleviating honest toil with social converse, but what youth will admit to a girl that he is anything less than a silent partner in the business?

Women who are employed suffer, too, because of their telephonitis friends who are not. These bores think business people have telephones on their desks just to make themselves accessible to their, friends during office hours and what are fifteen or twenty minutes now and then in an eight-hour day telephonitis reasons.

While the telephone is a mighty good servant, it becomes a tyrannical master in the hands of a person with telephonitis, but there are many ways to keep it from gaining the mastery.

Letters from an Old Timer to the New Troubleman

This Letter, to be Followed by Others Along Similar Lines, Answers the Questions a Trouble Shooter Would Like to Ask, but Never Does—Hints on Keeping "Ground" Where It Belongs—Of Especial Interest to the Common Battery Exchange Man

Mr. Troubleman.

Dear Friend:—Are you a good troubleman? You think you are, do you! Well let me ask you a few questions. Can you take any trouble slip the wire chief may give you, ask of him the questions that give you a little better idea of your trouble than the slip will give you, and go out to your line or telephone and "shoot" your trouble without any assistance from him whatsoever, except to give you your voltmeter tests and listen for noise? Do you know where all your lines are located, how they are put up, and in what condition they appear to the eye? Do you know your weak places? The mo ..t you receive and look at a trouble slip, do you say the first place to look for that trouble is in such a tree, or on such a pole, or down in a certain cellar or in a certain part of the telephone? Have you the ability and inclination, when a subscriber (who perhaps has cause for complaint) comes at you hammer and tongs, and berates the telephone company, the service, the operators, manager and everybody in general whoever had anything to do with his telephone or service, to talk to such a one and convince him that there is nobody to blame except himself for not getting things fixed, because the company is always trying to help him out of difficulties?

Are you a gentleman under any and all circumstances, courteous to the subscribers? Do you ever let an opportunity pass to speak a good word for your employers, and do you always get a pleasant "Thank you" from the subscriber after repairing the trouble? Have you knowledge sufficient to be trusted with the exchange for twenty-four hours, and the ability to repair any minor inside trouble if it should be necessary? Do you know the path of your battery in getting to you on the lines? Do you know what the line, cut-off, and cord relays are, and their resistances, and why a fuse will blow on your power board if a short circuit occurs in many parts of the exchange and you can not blow a fuse by a short-circuit at your rack or at the telephone? If you can answer "yes" to all of these questions, you will do. If there are any exceptions, get in training. All these are important to you.

A Chat on Common Battery Troubles.

The excessive demand for telephones and apparatus for the last few years has resulted in several slightly different systems being in use. However, they can be classified either as magneto, common battery, or automatic. I want to talk to you a little about common battery troubles today. Do you know what a ground is in telephone parlance? Could you give a detailed explanation? I will take it for granted that you can not as those "who know" will not read this. One side of your battery at the central office is grounded. In the ordinary system this side is called positive battery, and, from its connection to the tip of the plug may be also spoken of by telephone men as "tip" battery. Earth, ground, pipes, water mains, in fact everyhing that has electrical conductivity and a solid ground connection, carries potential of positive or "tip" battery. There are many reasons for grounding your battery in this way, some of which I will explain later. Now, in this system, another feed from the positive side is taken to the power board, where it is split up and distributed to the several desks used in operating purposes and also taken to the different positions on the switchboard. The sleeve or negative side is also taken to the power board like the tip, but this side being the impressive side is fused before going to the different parts of the exchange. A short circuit between the "tip" and "sleeve" sides of the battery circuit in any part of the exchange before the battery passes through resistance will instantly blow a fuse. The fuse makes a weak spot in the circuit, conveniently located so that if anything happens to short circuit a position only the fuse is damaged.

The Fuse an Electrical Safety Valve.

It is the safety valve of your exchange. The "tip" and "sleeve" battery before going to your line pass through resistance coils which reduces the current strength, often called by non-technical men the "amperage." Therefore you cannot blow a fuse in the central office by "shorting" the line. Now the same "tip" battery that is in your ground, wherever you may be in your district, is also on one wire of your line, while "sleeve" battery potential is on the other wire. Now you have three paths for current, two with "sleeve" battery and one with "tip." These three paths must all be kept separate from the others. If your sleeve wire gets against your tip wire you have a short-circuit, which will light the lamp on the board; if your sleeve wire gets against some conductor leading to the ground, then you light the lamp again, providing that enough current flows to overcome the resistance of the line relay.

"Live" Side a Natural Trouble Maker.

Your "sleeve" side acts as if it were always doing its best to get to ground, and always looking for every possible chance to meet its mate either in the ground or in the other wire. Your "tip" side of the line is not such a bad fellow. He doesn't care whether he gets to the ground or not; he simply says "What's the use, I am there already, only I have had to take another road about it. I will simply stay here, and if any convenient guy comes along I will drop on that and shake hands with myself, the ground. Also if some foolish lineman pulls my bed too hard against a tree in a short time I will be circulating freely with myself. But my best hold is, (and in this I only have an equal chance with my better half, Mrs. Sleeve), arrester or carbon grounds. A good fat thunder and lightning storm as a rule leaves me in many places, so I don't know whether I belong on the wire or in the ground, but soon there comes somebody around and puts Mrs. Sleeve and myself back in our proper places."

Machine Made V's—Common Sense Trouble Shooting.

Your sleeve grounds are ten or more to one tip ground. You will see why after reading the above. Now I will hand you a trouble slip of a line with a ground of some resistance on the sleeve. When you receive the slip what will be your thoughts as you look at it? I would give a great deal to know some of them. Amongst the thousands that I trust will read this letter some of you will think like this—!**--??? But others will think, as they should, "Where is my line; what kind of wire is the line, K. K., iron, or twisted, and how much of each? What condition was this line in when I last saw it? Can this be grounded in the cable box, or at the arrester for which have been the weather conditions most favorable? And so on until you shall have decided the best, or worst, place to find the trouble. This deduction should not take you more than three or four seconds. A systematic machine-made troubleman would go to the cable box first, pull the fuses and get

a test. On the other hand, an original, studious man would nine times out of ten go to his trouble, or so near it that a few moments' extra thought would get him there. But we will go to the cable box first, and locate our trouble beyond the box, in a lead of K. K.'s or iron wires with loops dropping off to telephones. Our ground is only on one wire, so what is the use of "chasing both wires?" We will select our "sleeve" wire and go ahead. How? did you say? That's easy! Put one of the clips of your test set on one of the wires of your line, and put the other one on the metal cable terminal, cable, messenger or anything that will give you a full "short" with the ground, then you will (if you put your clip on the sleeve wire) get the same click in the ear which you would hear if you put the clips on the two wires. The click will vary in loudness according to the conductivity of the path to ground. The less resistance to ground the louder the click. If you put your second clip on the "tip" wire you will get no click, because you are connecting tip and tip together. Now you follow up the sleeve wire and you will either find the ground in a tree, at an arrester, or possibly through a defective condenser. It is more than likely to be in a tree, because we thought it was in a tree before we started.

TESTING WHERE NO GROUND IS NEAR.

Many sleeve grounds seem mysterious. You may take off one that you could swear to, and still have a ground left; in such cases, find them all. If you wish to find the "tip" or "sleeve" wire on a lead where it is almost impossible to get a good ground, select one wire of the line you are on, and of which you know the number. Put your clip on this and put the other clip on a wire of another line. If you get no click, you either have two "sleeves" or two "tips." If you get a click you have illuminated the lamp in the office, and "Central" will answer faintly. Ask her the number of the line. If the number is not that of the line you are working on, then you are on the "tip" of your line, and the "sleeve" of the other line; if the number belongs to the line assigned you, then you have the "sleeve" of your line and "tip" of the other one. You say, "How is that?" In each case haven't you thrown your "sleeve" on the "tip" current? It doesn't make any difference whether it was its mate, or ground, or where you get it, so long as it was off the same set of batteries.

In the next letter I will tell you something of some cases of "tip" and "sleeve" grounds that have been puzzles. I am trying to make these things very plain to you, maybe too plain for some of you. But, remember when they were not so plain to you. Don't you "that know" be selfish. We are in this game to win, and we cannot win unless we give good service, and we cannot give good service unless every spoke in the wheel is good. You will agree with me that the troubleman is a mighty important spoke, and a little bit of the rim to boot. Well, so long for this time, see you later.

Yours very truly,

Fred Dewey.

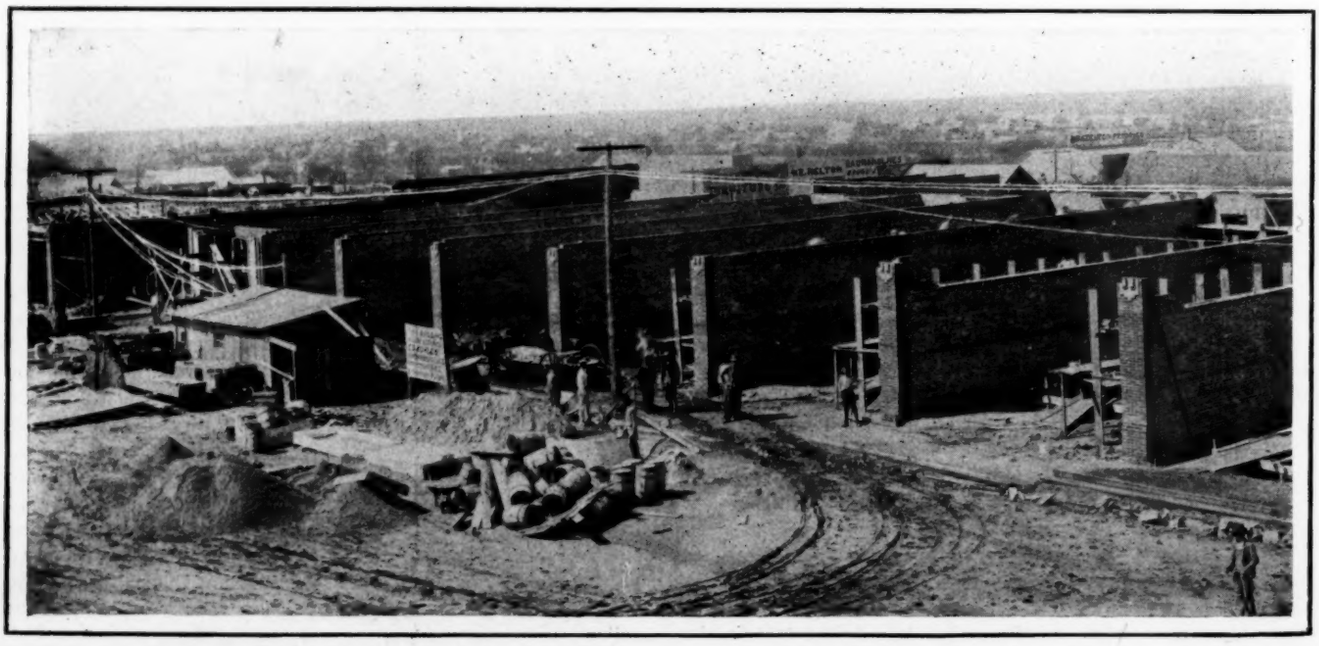
Oregon Company Has Courage to Persist in Charging Toll.

The Home Telephone Co. of Hood River, Oregon, is maintaining a new 10 cent toll charge between the upper and lower valleys, in the face of protests of the commercial organizations. Free service over trunk lines will be abolished all over the country one of these days, and the company which stops it now is in just so much better position to serve the public. The Hood River merchants are fighting their own best interests when they try to make the company do work for them at a loss. No company can long stand the drain of a heavy free trunk service.

Home Company Building New Town of Cross Plains.

The accompanying illustration, obtained through the courtesy of Mr. B. Richardson, secretary and manager of the Home Telephone & Electric Co., of Baird, Texas, shows the present central office, in what the writer describes as "the little 2x4 building in the street," and cable of that company's system in Cross Plains, Texas. The company will occupy the upper floor of the corner building under construction, which is shown in the photograph, when completed. Cross Plains is a new town which is being quickly settled, and Mr. Richardson says that a year ago cotton grew where the telephone poles now stand. Prospects for service in the new town are good, and within five or six months an exchange giving service to 300 subscribers will be working.

"Why should the spirit of mortal be proud?" asks the poet. Some justification might be felt if said mortal was in the Independent telephone business.



First Telephone Office in Shack, Soon to Be Moved to Big Building—An Example of New Town Growth.

Legal Cases and Decisions

By A. H. McMillan

Electric Shock From Using Telephone.

A newspaper reporter went to the Philadelphia Country Club to report a polo match and remained to dinner in the evening. About 8:30 in the evening, he went to the telephone booth to communicate with his paper. On taking the receiver from the hook, he received a shock and was severely injured. The occurrence took place during a violent thunder storm.

Alleging that his injuries were caused by the company's negligence, he brought suit to recover damages. A judgment obtained by him was reversed because it appeared that the company maintained on the telephone the best known device in general use for protection against abnormal or atmospheric electricity and was not negligent. The court also held that the fact that the telephone company did not place a warning on the telephone against its use during electric storms was not evidence of negligence in the operation of the telephone, in the absence of no showing that such warning was ever placed on the telephone or by any other telephone company on telephone instruments. It was also held that the rule res ipsa loquitur. Rocap vs. Bell Telephone Company. 79 A. 769.

No Responsibility for Abandoned Pole.

The Independent Long Distance Telephone Co., of Idaho, attached its wires to a pole that had been erected by others, and left them so attached for four years. Then it erected a pole of its own within a foot or eighteen inches of the pole to which said wires had been attached. Then it took all of its wires from the old pole and left the pole standing in the same position. Later another telephone company attached its wires to the pole and used it for two or three months, after which the pole was taken down by some one unknown to the defendant company and laid close to the sidewalk. There it remained for about two months, when a woman, who was passing along the sidewalk, caught her foot in a wire attached to the pole. Being thrown violently to the sidewalk and severely injured, she brought suit against the Independent Long Distance Telephone Co. A jury brought in a verdict in her favor, but judgment was reversed by the supreme court of the state on the ground that the company was not responsible for the taking down of its pole and placing it by the sidewalk. It having abandoned all the interest it had in the pole at the time it removed all of its wires therefrom. Powers vs. Independent Long Distance Telephone Co., 114 P., 666.

Franchises Under Post Roads Act Is Exempt from Taxation.

Whatever franchise or right a telegraph or telephone company acquires from the United States by its acceptance of the provisions of the Post Roads Act, so-called, giving such companies the right to use the military or post roads of the United States, is exempt from taxation by a state. So the Circuit Court of Appeals of the United States has held, in a suit brought by the Western Union Telegraph Co. against the comptroller general of the State of Georgia. The laws of Georgia (1902, page 37) provided for the imposition of a franchise tax on all corporations, domestic and foreign, which exercised any special right or privilege within the state not allowed by law to natural persons. The State Board of Appraisers, in making an assessment thereunder of a franchise tax against a telegraph company doing interstate business, which had accepted the provisions of the United States Post Roads Act, expressly found that the company maintained and operated its lines in the state under the franchise given it by such act, and stated that "our finding is therefore based upon and includes the value of the franchise conferred by the act of Congress." The tangible property of the company within the state was separately assessed and taxed under a different statute. The court held that this finding of the board was conclusive as to the basis on which the tax was assessed, and, since the assessment contained an element of unknown amount which was not taxable, a tax based thereon was illegal and void. It was shown that the net profit of the telegraph company for a year on all its business within the state, passing into, from, or through the state, was less than $2,000. In view of this fact, the valuation of its franchise by the state for taxation at $950,000, in addition to a tax upon all of its tangible property, was held excessive, discriminatory, unjust and unconstitutional. Western Union Telegraph Co. vs. Wright, 185 F., 250.

Negligent Installation by Hume's "Old Line Company."

A telephone company put a telephone wire running into a house near an electric wire and on a rotten post, so that a wind breaking the post, brought the wires in contact. The wife of the proprietor of the house, hearing the sharp snapping and seeing the flashes of fire from the dining room, where the telephone was located, had her husband called. He, seeing the danger, at once notified the electric light company of the situation and requested that the lights be cut off, so that he might remedy the matter. This was done and thereupon he cut the wires from his house and was attempting to clear his yard and the street thereof when the current was turned on again by the electric company. The house owner was immediately killed. Suit was brought by his widow against the telephone company. From a judgment of $20,000 in favor of the plaintiff, the company appealed. The Supreme Court of Mississippi affirmed the judgment, holding that the negligence of the telephone company in locating the wires was the proximate cause of the death notwithstanding the intervening negligence of the electric light company in turning on its current after being notified to cut it off. Cumberland Telephone & Telegraph Co., vs. Woodham. 54 S. 890.

Stockholders Cannot Complain of Sale of Part of Line.

The Bandera Telephone Co. of Texas contracted to sell part of its line. The purchasing company contracted with F. R. Caffall, a stockholder of the Bandera Telephone Co., to exchange his shares for its own stock. The stockholder alleged that the sale of the line was wrongful and fraudulent and sought to hold the purchasing telephone company liable. It was held, however, that the shareholder had no cause of action against such purchasing company, where it had in no way conspired with or aided the selling company. The action of the selling company was held not to be a conversion of the property of the shareholder in the company, and, unless the sale was fraudulent or ultra vires, shareholders must take the loss as a risk of the business. Caffell vs. Bandera Telephone Co., 136 S. W., 105.

Government Line to Lighthouse.

The United States government has decided to put in a telephone line connecting the lighthouse and life-saving station at North Cove with South Bend, Wash. The city council has passed an ordinance granting the government permission to use the streets and alleys of the city for the purpose of bringing the line from the river.

United States Consuls Report on Telephone Situation in Various Foreign Countries.

Interesting reports on the telephone situation in the Dominican Republic, Northern Spain and Switzerland, have been recently received at Washington from consular officers stationed in those countries. They follow in full.

DOMINICAN REPUBLIC.

FROM CONSUL PHILLIP E. HOLLAND, PUERTO PLATA.

There is no general telephone system in use in the Dominican Republic. The government operates long distance lines between all cities and towns, but the messages are transmitted through the operators, as no conversation is permitted except between state officials. .

Realizing the urgent need of such system, an executive order was issued on November 24, granting concession to anyone, under certain restrictions, to built and operate urban telephone systems in any and all cities and towns in the republic. The several systems will have no long distance connection with other cities, unless authorized by special concession. The maximum charge for telephone service will be $3 a month. The government officials will be given gratuitous service. Only one system will be allowed in each city. The order provides that anyone obtaining a concession must begin work on the construction within one year from the date of the concession.

Since the executive order was issued, concessions have been granted to build and operate telephone systems in Puerto Plata, Santiago de los Caballeros, and San Francisco de Macoris.

NORTHERN SPAIN.

FROM CONSUL GENERAL HENRY H. MORGAN, BARCELONA.

Not much has been done in northern Spain toward bringing the telephone service under municipal management. The principal company operating has its head offices in Barcelona, and has telephone stations in Madrid, Barcelona, Bilboa, Tarragona, Reus, Sabadell, Tarrasa, Mataro, Arenys, Argentona, Calella, Martorell, Igualada, Capallades, Olesa, Palamos, San Feliu de Guixols, Palafrugell, and La Bisbal. The actual number of subscribers at the end of September, 1910, amounted to 3,795. The service is operated by women.

Gerona and Zaragoza have each a private telephone company. The actual number of subscribers on October 1, 1910, was 150 and 600, respectively.

The city of San Sebastian has a municipal telephone service, which has been operated since July, 1909, under a concession obtained from the Government. Its central station has a capacity of 1,080 local and 60 interurban lines, divided into sections of 120 lines each. The system in use is called "Bateria Central," constructed in Belgium. The wires are partly overhead and partly subterranean, the present installations being capable of serving 2,000 stations. The lines are insulated with paper, and the line work was constructed by a German company. The actual number of stations in operation is 850.

The Santander system has been under municipal management since August, 1910. The approximate number of stations in use at the present time is 1,100.

In Bilbao the telephone is still operated by a private company, the idea of the city purchasing the service having not yet been considered. The number of telephones now in use in the city is 1,800. The instruments are made in Sweden and a few desk apparatus in Paris.

SWITZERLAND.

FROM CONSUL GENERAL R. E. MORGAN, ZURICH.

The general use of the telephone and telegraph in Switzerland is due to the fact that excellent facilities for communication are provided. Practically every postoffice in the country is provided with a public telephone and telegraph, and every community, no matter how remote, is supplied with both services. Rates are low, and every inducement is offered to the public to use the telephone and telegraph as means of communication.

The telephone rates to subscribers for each call, for a conversation lasting three minutes, are as follows: Within the city, town, or community in which the telephone is located, 1 cent; interurban calls, not exceeding 32 miles, 6 cents; not exceeding 64 miles, 10 cents; exceeding 64 miles anywhere in the country, 15 cents; for night service the last three divisions are 4, 6 and 9 cents, respectively.

The telegraph service is also inexpensive, the rate being 6 cents for each telegram and half a cent per word, making the cost of a 10-word telegram 11 cents, or 16 cents for a 20-word message.

The cost of administration of the telegraph and telephone service for the year was $3,222,000, and the receipts $3,223,000, leaving a balance of $1,000 profit to the government.

The total number of telegrams sent and received during 1909 was 5,202,969, which are classified as follows: Within the republic, 1,557,450; international, 2,541,454; in transit, 1,104,065. The percentages of business for the year is classified as follows: Telegrams for the federal and local governments, 1.96; for the various stock exchanges, 2.81; commercial, 36.05; private, 58.18; the press, 1.

The telephone statistics give the following for the year: Local calls, 41,417,376; interurban or long distance calls within the country, 8,879,537; international calls received, 259,095, sent, 253,354; international calls for which no fees were charged, 140,600. Total interurban and international conversations, 9,532,586; total conversations, 50,949,962; telegrams transmitted by telephone, 391,719; total telephonic communications for the year, 51,341,681. The population of Switzerland being about 3,500,000, the foregoing service shows that there were 1½ telegrams and about 15 telephone communications per capita during the year.

Advertising in Texas Directory Shows Notable Increase in Number of Subscribers.

The Tolar (Texas) Telephone Co.'s latest directory shows a marked increase in the number of subscribers over the previous one. This is one of the many companies which have been making use of the Kellogg company's "Borrowing nuisance" cartoon which was reproduced in TELEPHONY some time ago, it being prominently placed in the company's directory.

Mr. Price Kiker, the manager of the Tolar company, who will be remembered by many of TELEPHONY's readers because of his operator and mosquito cartoons, calls attention to the subscribers' manner of affably receiving the "busy" signal, in the following terms: "A great many telephone companies in Texas have tried to make an improvement on our common 'Hello' or 'Hel-lo.' some accent the first syllable, and some the last. Some drop the first syllable and just say 'lo' for brevity. I notice some of my subscribers have dropped the last syllable entirely when told a line is busy, and just say 'Hel'.

The business men of Tolar are well represented in this directory, advertisements being carried at the top and bottom of each page and on covers. Mr. Kiker reports that for a full page he received $5, half page $3, and for the top and bottom of the page $1. For druggists advertisements he made a charge of 50 cents, or five spaces for $2, and made a special rate of 7 tops or bottoms of pages for $5, and 4 or $3. The advertising amounted to $48.25, and the cost of 300 copies of the directory was $34.

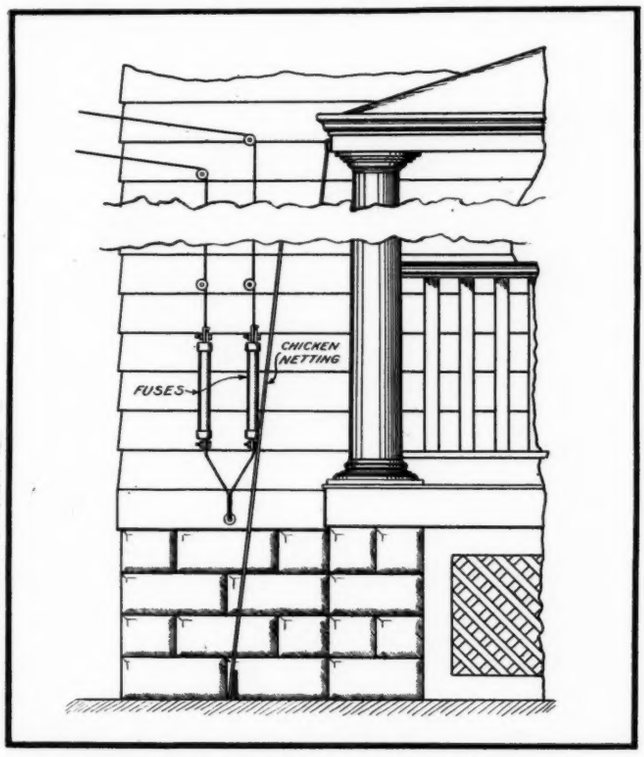
Oklahoma Commission Asked to Compel Installation.

Frank M. McPhall, of Ardmore, Okla., has filed a complaint with the corporation commission against the Pioneer Telephone Co. asking that service be furnished him. The hearing was set for August 9.

Practical Letters from the Readers

Ground From Fuses Mounted Outside Building.

I was given a four-party line circuit as grounded on one side, and after opening the different drops and testing in, I located the trouble toward one of the parties. On going to the house I found that the subscriber had stretched chicken netting from the top of the porch to the ground to train a vine on. The drop and line fuse were run right alongside of this netting and one of the ends of the line fuse touched the netting, which was a sufficiently good ground to cause the trouble. It is not the writer's intention to hold this up as a



Showing the Foresight Demanded of Installers.

difficult case to find or clear, but as it was a case out of the ordinary, I thought it might be of interest to other readers.

After clearing the trouble the drop was ordered changed to prevent it occurring again. The practice of mounting fuses outside is not common, and is now generally obsolete where once used, so this trouble will be new to the experience of many telephone men.

Chicago, Ill. L. S.

Experience in Handling Subscribers' Drop Wires.

Several letters addressed to the men in charge of construction for well known Independent companies were recently sent out by TELEPHONY, inviting the contribution of experiences and ideas on methods and cost of handling subscribers' drop wires. Contributions from any competent man, dealing with this subject, will be welcomed, and subscribers are cordially invited to contribute their views. Among the most interesting and useful letters already received is the following:

It appears to me that there are several ways of building drops, equally good, and that the general construction of the plant, and climatic conditions, would determine the size and kind of wire to be used. Where lines are liable to damage from wind and sleet a stronger wire would be necessary than where these conditions would not prevail. In northern cities it is customary to use No. 14 B. & S. copper, duplex; No. 14 B. W. G. bare iron; No. 17 B. & S. copper clad duplex, or No. 12 B. & S. bare copper, when copper wire is used in the lead.

The No. 14 B. W. G. bare is heavier than necessary, but the small difference in cost of a smaller wire would hardly justify its use. In the south much smaller wires may be used, and be just as satisfactory. In an all-cable plant, it is customary and desirable to have the lines and drops insulated from cable terminal to telephone, and when can top distribution is used this is generally done by some kind of duplex wire, without the use of cross-arms, the duplex wire being secured to intermediate poles by knobs. This will give a permanent installation with low maintenance cost. Where cable distribution is supplemented with open wire, it is customary to employ bare wire for the drop, or one side insulated, if a good clearance cannot be had. The general trend in construction is to use more and more insulated wire for drops, and probably in the near future some type of duplex wire will be used exclusively.

In answer to your queries, I will say:

I prefer some type of duplex wire for all drops. If iron wire is used in the lead, or if the drop comes from a cable pole, No. 16 Ironite or its equivalent; if copper wire is in the lead, No. 17 copper clad duplex. This may be used on common battery lines as well as magneto.

If care is used in placing a duplex drop, its life is about 12 years. In dead-ending a long drop, it is desirable to spread the wires on the knob, so they will not cross each other, and cut through the insulation. We purchase No. 16 ironite, 7-64 in. insulation, for duplex drops, and No. 14 iron triple braid tree wire when one side only is insulated. When a duplex drop joins an open wire lead, it is connected with the best test conductors to be had. A bare drop or single insulated is connected with sleeves or soldered. The use of sleeves or soldering is undoubtedly the best, but for party line work the test connector is very handy, and is extensively used.

It is desirable to please the subscriber with the appearance of the drop, and his wishes are always consulted before starting work. An insulated drop will not hum, nor will a bare wire drop if it is slack enough. When parties complain of noise, we change to a duplex drop. I have the cost of drops taken several years ago as follows:

Labor	$2.50
Material	2.00
Total	$4.50

The material cost includes all material for drop and line, except poles and arms, and covers a period of about six months. We formerly employed three linemen in a drop gang, but now use only two linemen, which would reduce the labor cost somewhat. Although I have not figured the difference in cost between a bare drop and a duplex drop, I believe the less labor required for the duplex would offset the material cost, and give a better drop for the same money.

V. I. FURNAS, Engineer, Louisville Home Tel. Co.
Louisville, Ky.

Heavy Subscribers' List of Creston, Iowa, Company.

TELEPHONY has received a copy of the July directory of the Creston, Iowa, Mutual Telephone Co. The directory contains on the inside cover an interesting list of "dont's," which are intended to assist the subscribers to obtain good service.

The list of subscribers contains about 1700 names. The directory carries the "Shield" as the leading feature on the front and back covers.

The company states that it has good long distance service to all towns in the Creston trade district, and is constantly extending and increasing its toll service.

From Factory and Salesroom

Conventions: North Dakota, Bismark, August 15, 16

A Safe Snap for Linemen to Use.

The lineman who is looking for a soft snap would better stay clear of the telephone business, but if any one is looking for a snap that will not make it necessary for him to examine the ground around the pole to see if it is a soft landing place before climbing, he will find just what he wants in the device made by the Walsh Safety Lock Snap Co., Bellevue, Ohio.

The Walsh Safety Lock Snap.

In the first place it is made in a design which insures that it will stand up under all strains which the use of a lineman can put upon the hook and ring. The hook is of nickel plated malleable iron, with working parts of hard sawed brass. It is set with screws which are upset to prevent their working out, but which may be forced out without injuring the snap, if one wishes to get at the inner parts.

The Walsh snap may always be depended upon for quick, sure action, for main strength and for elegance, as well as for ease in hitching and unhitching.

From the standpoint of everyday use, the advantages of this snap are set forth by its makers as follows:

It locks instantly.

In appearance it has no equal.

It is operated with one hand.

It stays locked until you open it.

It is absolutely safe and non-fouling.

It will not only pay linemen to investigate this for safety belts, but managers will find it worth while to investigate it for use upon the harnesses of horses employed in exchange work.

Over Fifty Years' Experience Producing Tools.

The firm of Mathias Klein & Sons, Chicago, was established in 1857, over fifty years ago, and has since specialized particularly in lineman's and construction tools of a high-grade character. It is said that the majority of linemen regard Klein pliers, climbers and splicing clamps as being indispensable. The company is well pleased with the way in which its tools are being adopted both in this and foreign countries.

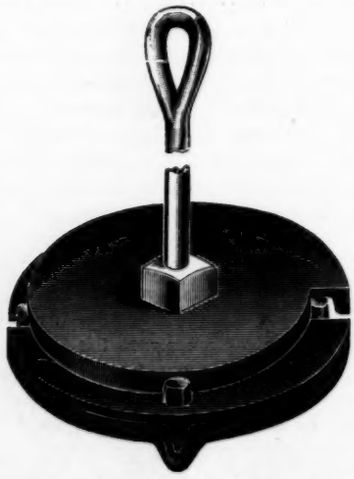


Fig. 1.—Miller Star Anchor Closed.

THE CENTRAL ELECTRIC CO., of Chicago, is selling a new fan motor warmth blast, which utilizes a protected heating element attached to the blade guard of the fan motor and connected to the lead wire supplying electric current to the motor itself. The fan blowing air through the heated coil warms the air, which in turn warms cold rooms, drys wet clothing and hair, or keeps the show window free from frost.

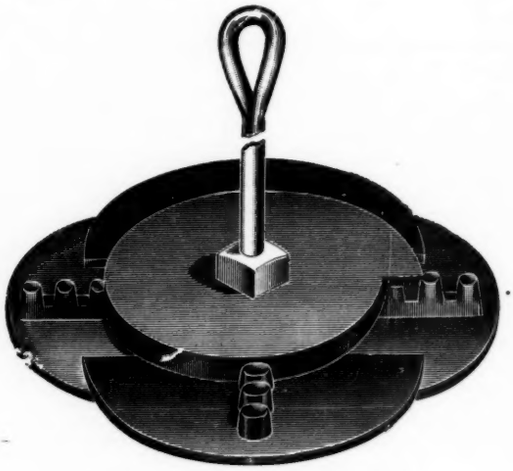


Fig. 2.—Star Anchor Expanded.

The Miller Star Expanding Anchor.

A new anchor has been placed on the market called the Star Expanding Anchor, which the makers, the Miller Anchor Co., of Norwalk, Ohio, claim will expand four ways.

The hole is bored just large enough to allow the closed anchor, as shown in Fig. 1, to go into the hole. When the anchor is placed in the bottom of the hole it is expanded by placing the wrench, shown in Fig. 3, over the hub on the top plate and twisting to the right until the blades are at their maximum expansion, as shown in Fig. 2.

If for any reason the workmen want to remove the anchor before the dirt is put in they can do so by simply placing the wrench on the hub again and twisting to the left, thereby closing the anchor. This is something that can not be done with any other expanding anchor on the market.

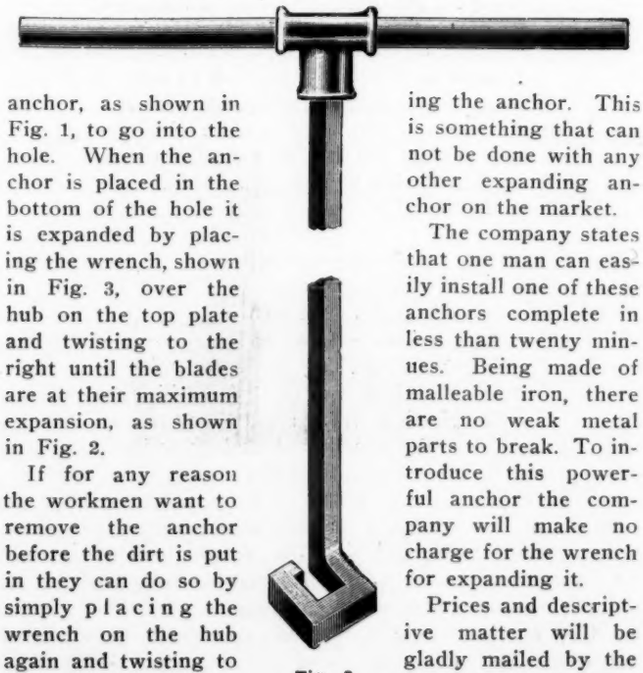


Fig. 3.

The company states that one man can easily install one of these anchors complete in less than twenty minues. Being made of malleable iron, there are no weak metal parts to break. To introduce this powerful anchor the company will make no charge for the wrench for expanding it.

Prices and descriptive matter will be gladly mailed by the Miller Anchor Co.,

Norwalk, Ohio. Correspondents will confer a favor by mentioning this paper.

Keep Your Transmitters Clean!

There are numerous ways in which telephone transmitters may become objects of danger to the users, and it is the duty of every telephone manager to protect his patrons against contagion, which may lurk in many forms in transmitters, particularly those on public telephones and pay stations, where the general public has access to them and they are in constant use.

The warm, moist breath of the user settles upon the rubber mouthpiece and inside the transmitter, where it soon becomes the seat of deposit for dust and germs of all kinds. Most of these are easily communicable to healthy people and so disease and sickness are spread broadcast.

Not only is this the case, but a transmitter in this condition soon becomes exceedingly obnoxious to users, more especially to women, and the employment of the telephone, instead of being a pleasure, is a burden to be borne as best one may.

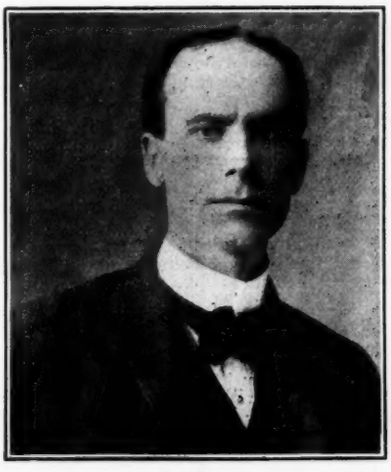
It is a perfectly simple proposition to keep the telephone clean and sweet-smelling, to drive disease germs away from it and thereby encourage its use. Why not make an effort along this line and see whether or not receipts increase?

Gillette's Telephone Disinfectant, made by the Telephone Equipo Co., Pleasanton, Kans., is a specific compound, declared by the manufacturers to be highly endorsed by leading dentists and physicians as a sure and safe remedy for the unpleasant and dangerous conditions noted. Any telephone man, anywhere, who will write the company asking for a sample will receive it by return mail, without charge. He may then experiment with the disinfectant and satisfy himself as to results.

John L. Fay Joins Matthews Organization.

On June 11, a farewell banquet was tendered to John L. Fay, superintendent of construction of overhead system of the Union Electric Light & Power Co., St. Louis, Mo., by S. B. Way, the chief electrical engineer, announcing to Mr. Fay's associates the acceptance of his resignation.

On July 13 the electrical department of the Union Elec-



John L. Fay

tric Light & Power Co. gave a banquet to Mr. Fay, at Forest Park Highlands, at which sixty-eight were present. He was there presented with a handsome diamond ring in token of their high personal regard for him.

Mr. Fay has had a wide and varied experience in the electrical field, he being one of the young old timers, having begun his first electrical work with the Elgin Arc Light Co., Elgin, Ill., when the Vandepool series arc system was first installed back in the early '80's. He then became associated with the Elgin Edison Co., in the operating branch, and later became associated with the National Electrical & Mfg. Co., of Eau Claire, Wis., in charge of construction on small central stations in various parts of the country.

In 1891 he was associated with the Tucker Electrical & Construction Co., of New York City, in charge of field work in the construction of isolated plants and central station work. In 1893 he was associated with the Dundee Electric Light Co. and the Dundee Rapid Transit Co. as superintendent of construction.

From 1897 to 1901 Mr. Fay occupied the position of superintendent of construction of the overhead and underground systems of the Laclede Power Co., of St. Louis. From 1901 to 1902 he occupied the same position with the Imperial Electric Light & Power Co., which was combined with the Missouri Edison Co. and others in 1902, forming what is now known as the Union Electric Light & Power Co. Mr. Fay has occupied the position of superintendent of construction of overhead system for this corporation from 1902 until July 15, 1911.

Mr. Fay is well and favorably known in the construction business and is an inventor of considerable note, having a number of valuable patents on improved safety devices, among which are the Fay insulator, which eliminates the use of tie wires, and the Matthews fuse switch.

After August 1, Mr. Fay will be associated with the well-known firm of W. N. Matthews & Bro., of St. Louis, in the capacity of sales engineer, covering appropriate work throughout the entire United States.

Personal.

R. A. Paterson has been appointed secretary and sales manager of the Duplex Metals Co., with offices in the Singer Building, New York City.

W. C. Church, of Des Moines, Ia., called on Chicago friends this week en route to New York.

W. A. McCombs, sales manager of the Pittsburgh Reinforcing Pole Co., was looking after the company's interests at Chicago and vicinity last week.

National Conduit & Cable Co. Looks for Better Copper Demand and Resumption of Buying in Fall.

The National Conduit & Cable Co. says in its monthly circular of the copper market:

"It is satisfactory to note that American consumption during the month of June approximated close to the 60,000,000-lb. mark. The May melting was also in large volume, and July will probably record a fair average mid-summer use of the metal. Measured by the size and variety of current new orders, however, it looks, at this writing, as if the August and September consumption is liable to fall well below the normal volume. It is not expected that inquiries from manufacturing buyers will develop much beyond the routine before fall, but fresh demand of good proportions is confidently looked for during the last quarter of the year.

"If manufacturers could see the copper situation on a thoroughly sound foundation, so that they could recommend their customers to protect themselves by carrying larger stocks, it would tend to greatly improve the situation. But with an available tonnage of 157,434,164 lbs. of marketable copper in the United States on July 1, and an average daily output from American mines during June of 4,151,810 lbs., it does not require the occult insight of a specially gifted prophet to understand why consumers do not enthuse over copper.

"The majority of mines can make money on the present market, and that being so, the proposition of curtailment has failed to receive sufficient support to make it a pronounced success."

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

FLOYD T. LOGAN, advertising manager for the Central Electric Co., Chicago, was married on July 6 to Miss Bernice Rhode, or Duluth, Minn. Mr. Logan, who bids fair to become generally known in the telephone field as one of its "live wires," was born twenty-one years ago in Wichita, Kans. Graduating from the Electrical School of Engineering, in Milwaukee, he entered the shops of the Allis-Chalmers Co., of that city, taking up practical work in numerous departments of that establishment, but concentrating on the electrical department. From there he went with the firm of John A. Gauger & Co., sash and door manufacturers, of Chicago, where he remained some time. In the latter part of January, of the current year, however, he concluded that there was no business quite so attractive as the electrical, and it was then he entered the employ of the Central Electric Co. as advertising manager. Mr. Logan brings to his work an intelligent appreciation of the intricacies of the business and his friends predict for him a gratifying success.

Floyd T. Logan.

MR. LEWIS ROSENBERG, of the engineering department of the Southwestern Telegraph & Telephone Co., was the subject of a brief biographical sketch in the last number of the "Southwestern Telephone News."

He was mentioned as one of the rising young men of the company, who has made good. Mr. Rosenberg received a degree in electrical engineering from the Case School of Applied Science, Cleveland, in 1905, and has made rapid progress in telephone work.

At a recent meeting of the Texas Academy of Applied Science he was elected a member. Lectures before the University of Texas classes and those at the Agricultural & Mechanical College have made Mr. Rosenberg well known in Texas educational circles.

FINANCIAL.

CARLINVILLE, ILLS.—The Macoupin Telephone & Telegraph Co. has filed an increase of capital stock of the company from $10,000 to $50,000. The document provides that there shall be 500 shares of preferred stock and 500 shares of common stock.

INDIANAPOLIS, IND.—The New Winchester Farmers' Mutual Telephone Co. filed a notice of increase in capital stock from $1,000 to $2,000. W. C. Oakley is vice president.

HAMMONDSPORT, N. Y.—The village board of trustees has granted the application of the Hammondsport Telephone Co. to amend its franchise and raise its rates from $6 to $9 and $12 for telephone service; $9.00 will apply to residence and $12 to business places.

CLEVELAND, OHIO.—The Peoples Telephone Co., of Geneva, will increase its capital from $10,000 to $30,000.

CLEVELAND, OHIO.—The United States Telephone Co. has declared a quarterly dividend of 1½ per cent.

ROCKLAND, WIS.—The Rockland Telephone Co. has increased its capital stock from $1,200 to $6,000.

WACO, TEXAS.—The Home Telephone Co. has changed its name to the Brazos Valley Telephone Co., and has increased its capital stock from $100,000 to $200,000.

FRANCHISES.

PHOENIX, ARIZ.—The Overland Telephone Co. has applied for a franchise for its system to operate in the town of Glendale.

NAPA, CAL.—W. M. Lyons has made application for a fifty-year franchise for a telephone line along all public roads of Napa county, Cal.

WEST PALM BEACH, FLA.—The Town Council has granted a 20-year franchise to the West Palm Beach Telephone Co.

FARMINGTON, UTAH.—An ordinance has granted to the Home Telephone & Electric Co. of Davis County a franchise to construct a public telephone line and electric light and power system on the public highways in Davis county. This was passed by the county commissioners recently.

CHENEY, WASH.—At a meeting of the council an ordinance was passed granting a 15-year franchise to the Consolidated Telephone & Telegraph Co. for the purpose of installing a local and long distance system. By the provisions of the franchise the work is to be done within one year.

SPOKANE, WASH.—The Washington Consolidated Telephone & Telegraph Co. has applied for a franchise to install a local system at Ritzville.

WENATCHEE, WASH.—At the meeting of the board of commissioners of Chelan county, franchises were granted to H. W. Boetzkes to construct and operate a telephone line from Chelan north about fourteen miles and to the Tumwater Light & Power Co. of Leavenworth to construct and operate a light and telephone system from Peshastin to Leavenworth and from Leavenworth up the Chumstcik river.

CONSTRUCTION.

BEDFORD, IA.—The Farmers Mutual Telephone Co. has been actively engaged in putting in a commercial line between this city and New Market. It is now ready for service between these points.

CADIZ, IND.—The Cadiz Telephone Co. has installed a larger switchboard in its exchange to accommodate new patrons.

JASONVILLE, IND.—The Mutual Telephone System of Linton and the McGrew System of Coalmont have built a trunk line between Linton and Jasonville, extending its service over a large extent of territory in Greene and Clay counties.

RICHMOND, IND.—Extensions of long distance telephone lines will be made by the Richmond Home Telephone Co. in the near future. Plans are already made for direct service to Liberty and Brookville. These towns do not now have direct communication with Richmond.

GOODLAND, KANS.—The Sherman County Telephone Co. has completed a six-mile extension of its line from Goodland to connect with its lines in the north part of the county.

RICHIE, KY.—The Richie Home Telephone Co., organized by C. M. Richie, F. H. Gross and others, will build lines from Richie, via Ball's Fork to Sassafras, Ky. F. H. Gross is manager.

ORD, NEB.—The Ord Independent Telephone Co. is rebuilding its line running north and east of Burwell and replacing it with a more direct line to Ord on the north side of the river. This will give the company two direct lines to Ord and will mean much better service between Burwell and Ord.

WAUSA, NEB.—The Union Telephone Co., which has exchanges at Wausa, Bloomfield and Crofton, Neb., is extending its toll lines to Center.

RUTHERFORDTON, N. C.—The Rutherfordton Telephone Co. will add overhead cable to its telephone system. P. W. Eskridge is the engineer in charge. It lately increased its capital to $10,000.

FAIRMOUNT, N. D.—The Fairmount Rural Telephone Co. is constructing a ten-mile line.

BIRMINGHAM, O.—The Riverside Telephone Co. has purchased the Bell toll line from Birmingham to Wakeman, and is rebuilding with new poles and wires.

GAFFNEY, S. C.—The Piedmont Telephone Co. contemplates constructing a telephone system to cost about $10,000.

FREDERICKSBURG, TEX.—The Texas Telegraph & Telephone Co. is constructing twelve miles of line to connect with Bear Creek and twelve new telephones will be installed.

VALENTINE, TEXAS.—The Mills Telephone Exchange Co., of Alpine, is here and the work of constructing a telephone system at this place has begun. A contract has been made for the immediate erection of an office building.

ELECTIONS.

CHARLESTON, ARK.—Mr. N. T. Minden has been elected president of the Franklin County Telephone Co. to take the place of Dr. K. E. Hudson, resigned.

JULIAETTA, IDAHO.—At the annual meeting of the stockholders of the Fox Ridge and Juliaetta Co-operative Telephone Co., the following officers were chosen: President, W. A. Borns; secretary, J. C. Groseclose; treasurer, O. U. Niles.

ELDORA, IA.—At the meeting of the stockholders of the Mutual Telephone Co. the following officers were chosen: President, Thomas Larson; vice-president, C. A. Reaver; treasurer,